THE ENGINEERING AND MINING JOURNAL.

RICHARD P. ROTHWELL, C. E., M. E. } Editors.
ROSSITER W. RAYMOND, Ph. D. }

NOTE.—Communications relative to the editorial management should be addressed to Mr. ROTHWELL. The articles written by Mr. Raymond will be signed with a star.

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THE DEMAND FOR ROCK DRILLS.

A VERY encouraging feature of the times is the more general adoption of labor-saving machinery. The narrow margin left for profit has demonstrated that only those who can produce economically can prosper. When the pressure of hard times was first felt, and was thought to be a temporary squeeze, the owners and managers of mines felt too poor to pay the first cost of labor-saving machines ; but as the impression gains ground, that working on narrow margins is to be the normal condition for the future, the question of economy of production takes precedence of first cost, and we note in consequence a more general adoption of improved machinery and appliances. Rock drills have shared in the benefit of this progressive movement, and we hear of large orders to several of the drill companies. One of these reports contracts for as many as twelve drills in a single day. Of these, four go to Canada, two to South America, two to Tennessee, two to Illinois, and two to Wisconsin. We also hear of a large number of drills going to our Western gold and silver mines, and of several going to Mexico, where the development of the mines is progressing with greater energy, and with full success. The Diamond Rock Boring Co. also reports a growing export business during the past year, and a greatly increased home demand.

TRANSFER OF ENGLISH CAPITAL TO AMERICA.

THE following items mark another step towards what we look forward to as an inevitable future :

"Superintendent KILLEBREW, of the Tennessee Bureau of Agriculture, Statistics and Mines, has received a letter from Mr. SAMUELSON, M. P., who represents a capital of $25,000,000 invested in iron manufactures in England, signifying an intention of establishing a branch of his house in Tennessee."

In connection with the above we note a rumor prevailing, that a party of English capitalists, accompanied by some scientific gentlemen, propose coming over to investigate our Western mines with the view of investing.

"The Liverpool *Courier* says it is rumored that a great Sheffield concern is about to transfer its plant to the United States."

The wonderful natural advantages offered by this country, not alone in our rich mineral deposits, but in our climate, and in the development of industries which the restless energy and ingenuity of our people insure, will naturally attract capital from the overstocked markets of the old world. The Centennial Exposition will certainly draw the attention of foreign capitalists to the advantages we offer, and we expect to see it followed by a very considerable influx of capital from England and Continental Europe.

We welcome the advent of this "British Gold." It will doubtless be accompanied with much of the experience gained only by age, which contribute largely to the pre-eminence of England among commercial nations, and we have no doubt the abundant capital which will be at the command of these Anglo-American enterprises will enable them to adopt those improvements in manufacturing, and to carry on their business on that large scale which will reduce cost to a minimum, and will enable us to compete successfully with England herself in the markets of the world.

THE CHINESE QUESTION.

THE question of "What shall we do with the Chinese" is fairly dividing with the silver question, the interest of the hour in California. Public meetings are being called, and the State Legislature was forced into enacting laws (since declared unconstitutional) with the view of preventing the immigration of these too industrious foreigners.

It is now proposed to send a deputation to Congress to lay the grievance before the Government, and see if it cannot find some effectual remedy for this threatening condition of affairs.

It is impossible to read the following extract from a leading California paper, without feeling the importance of the subject, and appreciating the difficulties surrounding its solution. Is the Mongolian race to starve out the Anglo-Saxon, as ours has driven out by force the native Indian? This is by no means so imaginary or impossible a future as that conceived by MACAULAY, for he savage New Zealand race.

"Congress may argue gravely and learnedly about treaty rights and international obligations, and so forth, but what will it do if American citizens, who are being even now crowded to the wall by these unassimilative foreigners, should some day rise in their desperation and do a deed that would sicken the civilized world? Such things have occurred in history, and like causes will produce like results. Nothing is more certain, moreover, than that eventually this country will have to decide whether it will expel the Chinese, fight them, or succumb to them ; for there is no question that the Chinese are, through their sobriety, temperance, industry, and frugality, destined to conquer wherever they set their feet, if allowed to compete with races possessing wider wants and more generous habits. Broadly speaking, the human being that can live upon ten cents a day will always subdue the human being whose needs require twenty-five cents a day to satisfy them. It is possible that in time the Chinaman's wants may increase and his frugality diminish ; but we perceive few indications of such a change at present, and, therefore the fact must be faced that he is a labor-saving machine of the most approved pattern. Nor will it do to talk about free trade in labor, as though the question of race was not a factor in the problem. Free trade in labor operates well where men of European ancestry are in question, but the Saxon and Celt and the Mongolian do not assimilate, have neither habits of thought, past histories, government views, domestic usages, religious beliefs, traditions nor languages in common, and it is hardly possible to doubt that the first effect of Mongolianizing this continent would be to extinguish the Republic. These are some of the issues involved in the Chinese question, and, on the whole, the Legislature may deem it of sufficient gravity to warrant the sending to Washington of such a deputation as has been propo ed."

THE TRANSMISSION OF GAS THROUGH LONG PIPES.

A FEW weeks ago we noticed the project for bringing the gas from the BURNS and DELAMATER wells in Butler County, Pa., to Pittsburgh, through thirty-five miles of pipe, varying in diameter from 6 inches at the wells to 10 inches at Pittsburgh. The project seemed to us a desirable one, but inasmuch as we have had it intimated that the existing line carrying gas to Messrs. SPANG, CHALFANT & Co's. mills through 18¼ or 18½ miles of 6 inch pipe, has not been as successful as was expected, and that the difficulty has been chiefly in the low pressure at which the gas is delivered at the mills, we suggested that a pipe of the proposed dimensions would be too small, and that by putting the larger section at the discharge end the *pressure* would be still further lessened. We also stated that "larger pipes, and fewer angles in them, form the natural and only effective remedies for low pressure and greater volume."

These remarks appear to have greatly disturbed the equanimity of the anonymous editor of the *American Manufacturer*, and, as is not uncommon where people lack knowledge or find facts intractable, he makes a personal attack upon the "active editor" of this Journal. So far as this is concerned, we can very well afford to ignore it. We do not pretend to be "experts" in that style of journalism. We will merely correct a mistatement with which the article opens by informing the writer that the results of Professor SADTLER'S analyses of natural gas were communicated to us during the Washington Meeting of Mining Engineers, February 23d, and, consequently, before they appeared in the *Manufacturer*. We were told they were not to be used till after they appeared in the State Geologist's Reports, but as we subsequently found them in the *Manufacturer* and other papers, no further objection was made to our doing so, and we published them from our own notes. The unknown editor can therefore calm his sensitive soul so far as this source of agony is concerned. As to his treatment of the professional or technical question, his criticism is almost too childish to require notice. He timidly intimates that the "purely practical difficulty" of insufficient supply and pressure "*might* be surmounted by other means than the one suggested by us as 'the natural and only effective remedy.'" And he thinks that our professional card "should imply that our education and experience would have grown a cautiousness against asserting a single suggestion to be 'the only effective remedy' for this practical difficulty." We agree with our critic that education and experience should induce cautiousness, but we think the line should be drawn somewhere short of pure childishness or incipient idiocy.

The subject of our remarks—the transmission of gas through long pipes—is a purely technical, and not at all a personal question. If the *Manufacturer* knows of "other means of effective remedy" for insufficient volume and pressure than those suggested by us, it is to be regretted that its excessive "cautiousness" deprived its readers of an unwonted pleasure ; for even a single grain of information would have added to the interest of its article.

For our part we frankly, though regretfully, admit that but two methods of overcoming this "purely practical difficulty" occur to us : the one, by diminishing the friction in the pipes ; and the other, by increasing the motive force. This last can only be accomplished by increasing the pressure of the gas as it enters the pipe, or by exhausting it at the discharge end, either of which would be inconvenient, expensive, and ineffective.

The laws governing the movement of gas or air in pipes are quite well understood. The resistance to the movement is directly proportional to the area of the rubbing surface, to the density of the gas, and to the square of the velocity of the current, and it is inversely proportional to the sectional area of the pipe. That is, it varies as the second power of the velocity, and only as the first power of the other functions; it is, therefore, very evident that more is to be gained by diminishing the velocity than in any other manner. There are, of course, other minor influences, such as the nature of the rubbing surface, the changes in temperature and density of the gas, and the very important retarding effect of angles in the pipe, etc., which would also have to be considered in determining, theoretically, the volume and pressure of gas that could be transmitted.

The question, however, is not one for complicated theoretical calculation, but for careful experiment. The present pipe of Messrs. SPANG, CHALFANT & Co. offers an admirable opportunity for testing the whole matter of discharge and pressure, and we consider the first step to be taken in organizing the new line should be a careful examination of this or some other long line, by a qualified expert, to determine the necessary conditions for success in the projected en-

terprise. Since our former notice of this project, we have been informed it is the intention to increase the size of the pipe from six to seven inches diameter at the wells, and from ten to twelve inches at the discharge end. Under the supposition that, if successful, the pipe will be tapped by works at several points in its course; that there will be a certain amount of leakage—likely to be quite important in large pipes and with high pressures—and that a certain amount of pressure is required to make the gas available at the discharge end, we still think the managers are in error in proportioning their pipes, and that a very much larger section would prove more economical and satisfactory in practice.

We have received several marked copies of the *Pittsburgh Chronicle*, containing the prospectus of the new Gas Fuel Company, and presume the statements there made are authorized by the officers of the company. It is much to be regretted, that statements so wild and inaccurate should be put forward as justifying the investment of capital in this concern. In saying this, we have no intention of discouraging the project; on the contrary, we think it both worthy and quite practicable. But if, after the expenditure of a large amount, it should be found that the money had been largely wasted, by reason of the project having been based on absurd assumptions, the whole subject would be brought into disrepute, and a serious obstruction be placed in the way of a more general utilization of this unequalled fuel.

The prospectus referred to makes the following startling assertion: "Actual experience and observation have convinced the manufacturers who are concerned in the enterprise that there is no limit known to the pressure of this gas well, except only that furnished by Mother Earth. *If all these gas wells were conveyed into the same line, the increased pressure would overcome any frictional obstacle, and, send the entire flow with its initial velocity and volume to the place of consumption.*"

This needs no comment.

It is also said that the loss of "pressure or velocity" in bringing the gas through 35 miles of pipe of 6, 8, and 10 inches in diameter, 11⅔ miles of each, would be but 14 per cent.

It is further stated—and Prof. OTTO WUTH is given as the authority—that the gas (from the Burns well) is almost altogether of the composition $C_4 H_6$; that its specific gravity is 1·56, or greater than that of carbonic acid; that 8½ cubic feet of gas weigh one pound; or 1,000,000 cubic feet weigh 58·7 tons, that in a specific case of a pipe 13 miles long, 2 inches diameter, an initial pressure of 200 lb. was reduced to 125 lb., and, consequently, that 1,000,000 cubic feet an hour would be discharged at a pressure of 50 lb. per square inch from a pipe 35 miles long, and 5⅛ inches diameter, the initial pressure being 100 lb. per square inch. We long ago pointed out in this JOURNAL that these figures are grossly incorrect. No natural gas of the composition given has ever been found. Every one knows that natural gas is lighter than air, instead of being more than one-half heavier, as here stated; and, all the calculations based on these figures, are of course worthless. We are not familiar with the experiments referred to in Prof. WUTH's report, but we believe there must be some serious error in them, or in the calculations. Professor WUTH, since his attention is directed to the subject, cannot fail to recognize the incorrectness of his statements as published, and whether the errors are merely clerical, or are in his analysis, he should hasten to correct them. We will be pleased to afford him an opportunity to do so, through our columns.

Many years ago a series of experiments were made on carrying compressed air through pipes into the Mount Cenis Tunnel, by a Government commission of scientific gentlemen, and from their experiments they deduced the following laws as governing the case:

1. The loss of tension or resistance is inversely as the diameters of the pipes.
2. The loss of tension is directly as the squares of the velocities.

They calculated that in carrying air *four miles* through a pipe eight inches diameter, the pressure would be reduced from 60 lb. per square inch, to 33 lb. While the conditions are not quite similar in the case of natural gas, they are sufficiently alike to make the statements given in this prospectus more than doubtful.

The project is good enough to command capital when presented in a form free from the exaggerated statements referred to, and we again commend to its projectors the preliminary investment in engineering skill, to determine in this practical and important question exactly what has been done, what can be done, and the best way to do what is required to be done.

THE WRIGHT PUMPING ENGINE AT TRENTON, N. J.

THE performance of this new engine, as described in Mr. F. J. SLADE's report, with advance copies of which we have been favored, call for some remark. The report is full of interest, and in at least one particular is unusually valuable and worthy of imitation; for it is scarcely too much to say that it is the only report made on any large pumping engine, since the time of the first Brooklyn engine, which has not had its usefulness impaired by a system of arbitrary allowances to overcome imaginary resistances.

The reports of many engineers have been remarkable rather for the ingenuity with which they can "figure up" the coveted "hundred million duty," than for the fairness with which they state the actual results obtained in practice.

The first experiment on the Trenton engine was made on February 9th and 10th, 1876, and although the engine had fallen a little short of the guaranteed performance, it was accepted by the Commissioners. The second experiment was of shorter duration, and was made for the satisfaction of the contractors, as it appeared the steam valves had been poorly set, and had leaked in the previous run.

During the first experiment, which lasted twenty-four hours, the pressure in the force main and the volume of water delivered, had been measured, indicator cards taken from the steam and water cylinders, and the coal fed into the fire, and the ashes withdrawn weighed. During the second experiment the coal and ashes were weighed, and the pressure of the water in the force main was measured. As the records were more complete in the first experiments, the results are entitled to greater weight.

We have extracted the following items from the report:

DIMENSIONS OF ENGINE.

Diameter of steam cylinder (high	inches	14·
" " " (low)	"	28·
" pump bucket	"	22·
" " plunger	"	16·
Stroke of all pistons	feet	4·

EFFECTIVE AREAS OF PISTONS.

High	sq. ins. 146·9	Pump bucket	sq. ins. 179·2
Low	" " 603.2	" plunger	" " 201·1
Ratio	" " 4.1:1	Valves (suction)	" " 336·0
Ratio of effective area of low pressure piston to suction of pump			" " 3.17:1

DIMENSIONS OF BOILER.

One cylindrical drop flue boiler, 60 inches diameter, and 16 feet long, with internal furnaces, gas passing forward through 4 9½-inch flues, 11 feet 7 inches long, returning through 30 4¼-inch tubes, 9¼ feet long, thence under the shell of boiler. Feed-water heater in last flue:

Grate surface	12·3	Ratio to grate	49:1
Heating surface	604·0	" "	4·9:1
Cross section of tubes	2·6		

DIMENSIONS OF PIPES.

Length and diameter of force main (cast iron)	⅞ mile—16 ins,
Distance from surface of water in well to surface in reservoir	103½ ft.

RECORDS OF EXPERIMENT.	I.	II.
Duration in hours	24·	14½

PRESSURES.

Steam in boiler by gauge	pounds 68·1	76·3
Vacuum in condenser	inches 25·6	25·8
Mean indicated total pressure—high, 55·46; low, 10·62 (?)		
" " " " 41·74 " 7·05		
" net " " 41·74 " 5·66 (?)		
" back " " 12·72 " 3·57 (?)		
Pressure shown by gauge on force main + distance from center of gauge to surface of water in well.. engine at rest..	44·84	45.20
" " running..	48·84	48·68

TEMPERATURES.

Water in well	123°	122°
Feed water	35°	36°

HOURLY QUANTITIES.

Pounds of coal fed into furnace	105	100
" ashes and refuse withdrawn	3·7	9·4
" combustible	101.3	90.6
" water evaporated, per hour (?)	1272	1111
" water to pump's displacement	12100	12660
" " delivered by pump	11600	

ECONOMIC.

Pounds of water evaporated from 212° by 1 lb. combustible	12·00(?)	12·00(?)
" combustible per hour per sq. ft. of grate	8·2	7·30
" " " " " " heating surface	0·168	0·149
" water per hour, per total horse power	50·2	
" " " " indicated horse power	47·5	
" " " " net " "	45·0	

DUTY.

Duty—per 100 lb. of combustible computed on the volume of water delivered, and on the pressure as shown by gauge	81,035,500	90,132,000
per 100 lb. of commercial anthracite coal having 1-6 ashes and refuse	64,866,800	72,145,600

The water delivered was partly measured by a weir which was placed at the overflow from the reservoir, partly lost by leakage from the reservoir, and partly retained in the reservoir. The first and last items could be measured with approximate accuracy, but the second must have been uncertain. As the leakage was a large proportion (nearly ten per cent.) of the water delivered by the pump, the measurement of total water delivered by the pump is a little uncertain. The difference between the pump displacement and the water presumed to have been delivered was only 3½ per cent.—a very small margin.

Friction of Water in Force Main.—This is given by the difference in the reading of the pressure gauge when the engine was running and at rest, and was, in the 1st experiment, 4 pounds, and in the 2nd experiment, 3½ pounds. The friction computed by the formulæ given by RANKINE would be 4½ feet or 2 2-10 pounds, nearly, if the air vessel were of sufficient size to keep the pressure in the pipe and, therefore, the velocity constant. If the velocity of the water in the pipe varied, during each stroke, from 0 to 3·8 feet per second, corresponding to the velocity of the pump piston, the friction would vary from 0 to 12 pounds, and would have a mean value of more than 6 pounds.

Coal Consumed.—The coal *consumed* was measured by deducting from the coal fed into the furnace the ashes drawn out. In the first experiment the fires must have been full of ashes at the close of the run, for the proportion of ashes was only 3½ per cent. This will not, however, affect, materially, the result as measured by the coal consumed or the *combustible*, for if the additional 300 pounds of ashes had been taken from the fires, their place must have been supplied by 300 pounds of new coal, and the balance of coal remaining after the ashes are deducted would be the same as before.

Friction of Engine.—The friction of engine appears to have only been 1 3-10 pounds per square inch of low pressure piston, a really small amount.

Pressure to Lift Valves.—The pressure to lift the discharge water valves is giv-

en in report as 1·4 pounds per square inch, and as it was probably the same for the suction valves, the pressure required to lift both sets of valves was 2·8 pounds, or nearly six per cent. of the useful work. As this pressure would have remained the same if the engine had been working at a higher lift, the duty on the higher lift would have been improved.

Pounds of Steam per Horse Power per Hour.—It is to be regretted that in this case the feed water was not measured, but, if we assume that the boiler would have evaporated 12 pounds of water per pound of combustible, from 212° or 11·16 pounds, the temperature of the feed, we would have the weight of steam formed per hour 11.30, and per

Total horse power	21·2 pounds.
Indicated horse power	23·6 "
Net horse power	25·0 "

These valves are all large, being about 25 per cent. more than has been obtained in similar engines.

The indicator cards show signs of considerable leakage, and the small pressure required to overcome the friction of the engine shows that the packed joints were loose. The economic performance of the engine was probably injured, both by these leaks and by the very high grades of expansions, being sixteen times. The grade of expansion was fixed by the boiler pressure, and the relative sizes of the steam cylinders and the pumps. The performance would probably be considerably improved it the water cylinders were larger, and the engine run slower.

Annual Duty.—We should expect a better annual duty from this engine, than that indicated by these tests. The experimental duty per 100 pounds of commercial anthracite having one-sixth refuse, in the best case was seventy-two millions, which, allowing ten per cent. for banking fires, etc., would correspond to an annual duty of sixty-five millions. This engine could probably be adjusted so as to give an experimental duty of eighty millions, and an annual duty of about seventy millions for 100 pounds of commercial anthracite.

COAL AND IRON OF SOUTH-EASTERN TENNESSEE.

Special Correspondence of the Engineering and Mining Journal.

THE coals of Walden's Ridge, of the Tennessee coalfield, are of admirable quality, generally ; remarkably free from sulphur, iron pyrites, or other impurities. They are semi-bituminous and semi-anthracite in character. The semi-bituminous kinds resemble the coals of the Frostburgh or Georges Creek coalfields of Western Maryland, looking as though they were half coked, and being soft and friable, and disposed to produce much slack or fine coal in mining. They coke well, and the fine coal is valued equally with the lump. The semi-anthracites are harder, more cubical in character, burn with less flame, but emit a more powerful heat.

There are a number ot seams, probably six or eight, but they are all quite thin, ranging from a few inches to three and four feet. Sometimes, however, a seam rising to extra height, but this is a local feature, and is due to the enlargement of the bed, at the expense of its sudden disappearance, or its thinning away to a mere trace, near by.

All the strata of Walden's Ridge have been disturbed, and the coal is found occupying tilted positions like the anthracite deposits of Pennsylvania, and from the same causes, to wit : gradual but irresistible subterranean forces. In the older formations there are several beds of hematite iron ore, which, though separated from the coal strata by 1,000 or 1,500 feet of rocks, come to the surface within a few hundred yards of the coal, by reason of the erosions of the valleys and the inclination of the rocks. The limestones of the Silurian strata also come to the surface, offering in one vicinity all the raw materials necessary to the manufacture of iron. The iron ores are of good quality, surpassing the native ores of Pennsylvania or Ohio, and yielding 40 to 50 per cent. in a raw state.

There are five blast furnaces in the State making iron from stone coal, and some half a dozen or more coal mining centers. The principal mines are those at Tracy City, in Grundy County, which furnish fully one-half of the coal production of the State. The majority of the miners are convicts from the Penitentiary.

The Nashville and Chattanooga RR. crosses the coalfield, and some coal is mined along the line of that road ; several mines opened on Walden's Ridge ship coal down the Tennessee River to Chattanooga. The Cincinnati Southern RR., now in course of construction, also crosses the coalfield. Coal and ore lands are abundant and cheap; $10 per acre is a large price along the line of the railroad, and many lands of extraordinary value as mineral property, back from the line of the road one or two miles, can be had for a dollar an acre.

The country is healthy, but rough and mountainous, and at some future day will be a great coal and iron producing region. The lands which the Miners' National Association propose purchasing, with the view of mining on the co-operative plan, are located on the line of the Cincinnati Southern, about 60 or 70 miles from Chattanooga, and within a few miles of the Tennessee River.

A. R.

THE JULIA MINE.—The *Gold Hill News* says : The shaft, one of the finest on the Comstock Lode, has been sunk to a depth of 1,710 feet. Stations have been opened, and prospecting drifts run at the 800, 1,000 1,400, and 1,600-foot levels. A working station has also just been put in at the 1,700-foot level, and sinking the shaft below that point resumed. Excellent ore prospects are being developed on the 1,000-foot level, although at the point where it was prospected the ledge was not sufficiently concentrated to afford bodies of paying ore. On the 1,400-foot level a fine vein of quartz twelve feet wide, was encountered fifty feet west of the shaft. On other levels quartz and spots of ore have been found, but thus far not in quantity sufficient to pay. The bottom of the shaft is now in quartz, carrying spots of ore, mixed with streaks of porphyry and clay. It is at this time the deepest perpendicular shaft on the Comstock, having been sunk a distance of 650 feet during the past year. At all points in the bottom of the shaft and in the face of the drifts, on the 1,400 and 1,600-foot levels, the mine is perfectly dry, it being necessary to carry water pipes down from the surface into the drifts to furnish water for drilling and to cool the drifts when blasts are discharged. The Burleigh drills, used in every face, work to perfection, a nest of holes being driven in the face of the drifts and then all exploded simultaneously. Progress in the face of the main drifts on each level for the past six months has averaged from eight to nine feet per day, which, considering the size of the drifts and the amount of matter excavated, is without a parallel, even in the history of our fastest mining operations on the great lode. The hoisting and pumping machinery is all in the best possible working condition. It has ample power to sink the shaft to a depth of 2,500 feet or more. The pumps are used but little at present, as the mine has been almost entirely dry since the shaft passed the 1,000-foot level in its downward course. A large air compressor furnishes not only air for all the lower levels, but also power to drive three sets of rock drills, one at the bottom of the shaft, and one in each of the main drifts on the 1,400 and 1,600-foot levels. Two new hoisting reels of the best approved patterns, have just been put in place, and two new steel wire cables, 5½ inches wide, one inch thick, and 2,400 feet in length, added to the other improvements, the full length of the old cables having been reached.

THE SULPHUR IN NOVA SCOTIA GAS COALS.

HALIFAX, N. S., March 28th, 1876.

TO THE EDITOR : SIR—I beg to inclose a copy of a letter I addressed to Professor CHANDLER, to which he did not deign to reply. I have delayed calling your attention to the statement made in your JOURNAL, to which it refers, thinking that a scientist of Professor CHANDLER'S standing would either produce his authority or acknowledge that his statement was based on imperfect data. As he has not done so, I presume he is unable to substantiate his statement. I therefore write to you, trusting you will have the kindness to insert this in your JOURNAL (unless I have written to the wrong man), as a denial of the accuracy of the statement referred to, respecting the character of Nova Scotia gas coals. Our gas coals may not be so good as the best American, but that surely does not justify a man of reputation making them out worse than they really are. They have been considered good enough to shut out of your markets ; after that to traduce their character is like kicking a man when he is down, conduct long recognized as reprehensible. Yours, etc., HENRY S. POOLE,
Inspector of Mines.

(COPY.)

HALIFAX, N.S., January 7, 1876.

PROFESSOR CHANDLER, PH. D., Columbia College :

DEAR SIR—Permit me to recall to your recollection the statement you made before the Gas Light Association of New York, October 20th, 1875, "That Nova Scotia gas coals (Glace Bay, Bridgeport, International, etc.,) contain from 3 to 5 per cent. of sulphur. I trust you will pardon me for writing, but I cannot find in any of the analyses at my command any such percentages. All I can find give for Glace Bay 2·29 ; Bridgeport, ·77 to 2·18 ; International, ·90 to 2·26; and Caledonia, 2·06 to 2·17 per cent. May I hope you will do me the favor to send me copies of some of the analyses from which you drew the conclusion quoted above, and greatly oblige,

Yours very respectfully, HENRY S. POOLE, Inspector of Mines.

THE CORNWALL IRON MINE AND SOME RELATED DEPOSITS IN PENNSYLVANIA.

By T. Sterry Hunt.

(Abstract of a Verbal Communication made to the Institute of Mining Engineers, at Washington, D. C., February 23, 1876.)

I HAVE, in a previous communication, called the attention of the Institute to the geognostical relations of the crystalline iron ores belonging to the Eozoic rocks of North America, at which time I noticed (1) those associated with the gneisses of the Laurentian series, (2) those of the crystalline schists of the Huronian, as seen in Northern Michigan and in many localities along the Appalachians ; (3) those of South Eastern Missouri associated with petrosilex—porphyries and schistose rocks, and presumed to be nearly of the same age with those of the Huronian schists ; and (4) the highly titaniferous ores of the Norian or Labradorian series from Essex County, New York, and in various parts of Canada. It may here be remarked that, although the presence of titanium is most marked in the Norian ores, this objectionable element is sometimes found in the schistose ores of the Huronian, and to a lesser extent in certain Laurentian magnetites. The ores of each of these geological divisions have their individual peculiarities, which serve to distinguish them to such a degree that the magnetites and specular ores of the Laurentian are as dissimilar to those of the Huronian as are the crystalline rocks of the two series. As it happens that these mineralogical dissimilarities correspond to differences in composition and in adaptability to different processes of manufacture, which, in the present condition of the iron industry, are objects of special consideration to metallurgists, it will be seen that these geognostical distinctions become of great practical importance.

During the past year I was desired by the Geological Commissioners of Pennsylvania to devote a few weeks to certain geological studies in the Eastern part of the State, in the course of which I was enabled to make, with regard to its crystalline iron ores, certain observations to which I desire to call the attention of the Institute. I may mention, in passing, that the great South Mountain belt, from the Schuylkill to the Delaware, is composed of Laurentian rocks, in which are found the characteristic ores of the series like those of the Highlands of New Jersey and New York, and of the Adirondacks. Numerous workings near Rittenhouse Gap, in the Eisenthal, and at Leisholtzville, Mount Pleasant, and Bechtelsville show the existence of valuable deposits of these ores, and it can hardly be doubted that a systematic and careful exploration of the whole of this mountain region by the aid of the dipping-needle will develop many more. The similar Laurentian region of the Welsh mountains to the south of the Red Sandstone belt offers a not less inviting field. Pennsylvania is now a tributary for these ores to New Jersey, the Hudson, and Lake Champlain, while the great area of ore-bearing Laurentian rocks within her borders remains comparatively unexplored.

But I have now to bring to your notice an important class of crystalline iron ores, chiefly magnetites, which alike, by their geological position and their mineralogical associations and characteristics differ from those already noticed, and appear to belong to a distinct ore-bearing horizon. I allude to those ores which are found over Pennsylvania, along both borders of the Mesozoic Red Sandstone formation which stretches through the State, including on the south side those of Warwick and the Jones Mine; and on the north side a line of deposits from Boyerstown and the vicinity of Reading, to beyond the Susquehanna, including the great Cornwall Mine near Lebanon. These ores were, by Prof. H. D. ROGERS, referred to what he designates as the Primal Slates, which he regarded as the lowest member of the Paleozoic series ; though by some later observers, the Cornwall Mine, and certain related deposits west of the Susquehanna, have been referred to the Mesozoic Sandstone. It would be foreign to my present purpose to set forth the reasons which lead me to conclude that they are really contemporaneous deposits included in the Primal Slates, which correspond to a portion of the Lower Taconic series of Emmory, and belong, in my opinion, to a lower horizon than the Potsdam Sandstone of the New York system. That they are met with only along the borders of Mesozoic Sandstone formation, is due to the fact that these ancient ore-bearing rocks, from their decayed condition, and their inferior hardness, have been removed by denudation, except where protected by the proximity of the newer sandstones, or of eruptive rocks, as is the case at the Cornwall Mine. This remarkable deposit of mag-

netic iron ore rises from the surface along the northern border of the Mesozoic Sandstone, which here forms the southern limit of the great Auroral limestone valley. The area of the ore exposed measures about 4,000 feet in a direction nearly east and west, with a transverse breadth of from 400 to 800 feet, and includes three hills, separated by two valleys running nearly north and south. Of these hills the eastern, which is the highest, is said to be 960 feet above tide-water, and a little over 300 feet above the brook flowing in the ravine which divides it from the middle hill. This, which is larger in area than the others, rises, in its highest part, nearly 100 feet, while the western hill is a little lower. A careful inspection shows that these elevations are due to the presence of a great ridge of eruptive rock, apparently a dolerite, which surrounds the eastern hill on the south, east, and north, forms the northern border of the middle hill, and sweeps around the northern and western sides of the western elevation. Although now broken through at the transverse valley, this great belt of eruptive rock was, probably, once continuous, and being curved in form, like many of the dykes of the Mesozoic, has evidently served to protect the inclosed ore-bearing strata, which both to the east and the west have been eroded and swept away in past geological ages. Transverse intersecting dykes and tongues of eruptive rock are seen in various parts of the eastern hill to penetrate the mass of ore without, however, apparently affecting it, or altering its character; and we must, I think, conclude that the trap, which was a subsequent intrusion into the ore-beds, has no farther connection with their present condition than is implied in its protection of them from waste and removal. From the valley which separates the middle from the eastern hill, the western face of the latter is seen to consist of nearly horizontal beds of ore lying between the upright bounding walls of trap, the extremities of the curved rim of this rock, which surrounds, on the other sides, this great mass of iron ore. At the base, the inner surfaces of these walls are, probably, not more than five hundred feet apart; but, as they ascend, are separated to six hundred feet or more. Between these ore is found in nearly horizontal strata, sometimes slightly contorted and associated with layers of a greenish granular silicate, and more rarely with a chlorite-like mineral or with serpentine. Besides these small quantities of iron pyrites, sometimes cobaltiferous, are found, and a portion of copper chiefly in the forms of copper pyrites and red oxyd. These latter ores are in some parts of the deposit so abundant that they are selected in mining the iron ore and sold to the copper smelters. The whole of the deposit as mined, with the exception of the richly cupriferous portions, and some thin layers in which the silicated minerals predominate, is fit for the furnace, and will probably yield an average of 50 per cent. of iron, while large quantities can be selected which are much richer and nearly pure magnetite. Its associated minerals, not less than its comparative softness and friability, due to the slight adhesion of the crystalline grains, serve to distinguish it from the magnetites of the Laurentian rocks. I have not been able to find any analysis of the ore of great deposit, but it is, probably, like the other similar ores of the region, comparatively free from phosphorus, since the pig metal made from it has been largely used at Harrisburg as an admixture for the production of Bessemer steels, for which purpose the small proportion of copper which it contains does not seem to unfit it. The small amount of sulphur, which is present in the form of pyrites, may be readily expelled, if desired, by a preliminary roasting, and has been spontaneously removed by oxidation in the weathered portions of the ore at the surface of the deposit, which are carefully reserved and command a high price for fettling in the puddling furnace. The facilities for mining this ore are very great, horizontal lodes being worked in successive benches forming wide terraces on the hill-side, which are accessible by railway tracks and locomotives. I am informed that the greatest production of this mine has been about 200,000 tons yearly, but it would be easy, if demanded, to supply a much larger quantity of the ore, the more so as workings are not confined to the eastern hill, but extend to the others named, which afford also very large quantities of ore. As regards the further extent of the deposit, it may be noticed that excavations in the plain, to the east of the hills, and, consequently, outside of the limits of the trap, show the existence of large quantities of similar ore, which were mined at an early period. In the area of the middle hill, moreover, as I am informed by Mr. BOYD, the obliging superintendent of the mine, two borings have been sunk to depths of 240 and 335 feet below water level, the whole distance being in iron ore. The strata in this portion offer but gentle inclinations, so that these measurements do not much exaggerate the real thickness of the immense mass of ore which lies beneath the surface.

Proceeding eastward along the same geological boundary small deposits of magnetic ores, very like in character and in mineral associations to those of Cornwall, have been mined at Wheatfield, seven miles west of Reading, and again at the Rondenbusch Mine and at Fritz's Island in the Schuylkill. Others are met with to the west of Cornwall, and in the vicinity of Dillsburg, beyond the Susquehanna, openings have been made on many similar deposits. These, though of comparatively small extent, yield a superior magnetic ore, closely resembling that of Cornwall in the character of the associated silicates, and in the presence of small quantities of copper and of cobalt. From the analyses by Mr. MCCREATH, it appears that these ores contain considerable proportions of both lime and magnesia in the formed silicates. In one of the deposits, near Dillsburg, the magnetite is associated with some specular hematite, which, in another opening, prevails to the exclusion of the magnetic species. These Dillsburg ores are interposed in granular siliceous rocks, and are associated, in most cases, with eruptive traps, not unlike those of the Cornwall Mine, a fact which has served to confirm the popular notion that these ore-deposits are in some way dependent upon the eruptive rock. It is, however, seen in some cases where these traps cut across and interrupt the ore-deposit, that this is continued unchanged on the farther side of the dyke, and at Wheatfield where similar ores are mined, these traps are wanting, although the miner, firm in the conviction that trap-rock was an indispensable condition of a successful mine, maintained the granular detrital quartzite, with which the ore is here interstratified, to be itself a trap.

At Boyerstown, in Berks County, similar deposits have been long known and layers of magnetic ore of no great thickness have been worked down slopes of about 45° to the south-east, in one instance, to a depth along the incline of 400 feet. A vertical boring made near by, in 1873, after penetrating 376 feet of rock, passed through 211 feet of granular magnetic ore which, with an inclination of 45° corresponds to a thickness of about 140 feet. A shaft measuring seven by thirteen feet, had, at the time of my visit in September last, been sunk to a depth of 300 feet to open this great bed of ore, which, judging from the quality of that mined at the slopes, and from a partial analysis of that from the boring, bids fair to be of great value, and, probably, well adapted to the manufacture of Bessemer metal.

I can only allude, in this connection, to the very extensive deposits of similar ores in the same geological position at the Warwick and the Jones Mines, on the south side of the sandstone belt, which, though somewhat more sulphurous than those of Cornwall, have been mined and smelted for a century, and are greatly esteemed. The facts which I have set before you suffice to show that, apart from the brown hematites of the valley, which have been in the past such a source of wealth to the State, and besides the magnetites of the South Mountain from the Delaware to the Schuylkill, Pennsylvania has, along the border of the Mesozoic sandstone, iron resources of as yet unknown magnitude, of which the Cornwall bed is but a single example, preserved above the surface by the fortunate accident of protecting walls of trap. For each deposit of great thickness like this, there are, undoubtedly, very many smaller ores, but the form of these, as I have seen in several instances, is lenticular, so that if they are pinched out in some cases they open out to greater widths in others; as is strikingly seen at Boyerstown, where the deposits of no great thickness at the outcrop expands at the point reached in the boring to 140 feet. While the ores of all these deposits along this geological horizon agree in certain qualities, it need not be said that careful metallurgical trials, guided by minute chemical analyses, will be necessary, before their true value can be fully made known. It also remains to be determined whether these same ores can be traced beyond the limits of Pennsylvania into New Jersey on the one hand, and into Maryland and Virginia on the other. I deem it proper to state, that the object proposed in my late preliminary examination of the ore deposits, above noticed, was geognostical rather than economical, and that farther and much more detailed studies, alike geological, mineralogical, and chemical, must be made before the history of these important ores can be considered complete. Such a work will doubtless be the care of the new geological survey of Pennsylvania, in whose published reports Messrs. PRIME, FRASER & MCCREATH, have already performed a similar task for the brown hematite ores of a large portion of the State.

Meanwhile my report to Professor LESLEY, the director of the survey, will contain a detailed account of my own observations.

I may remark, in concluding, that these magnetic and specular ores of the Primal Slates, have very close geological relations with the brown hematites of the region, some of which are known to belong to the same Primal Slates. These ores, which I believe to come from the alteration of deposits of carbonate, and in many cases of sulphuret of iron, oxydized in situ, are in certain deposits of the region interstratified with crystalline, magnetic, and specular oxyds, the whole being imbedded in the clays which have resulted from the more or less complete decomposition of the inclosing crystalline schists.

THE QUESTION OF CHEAP GAS MAKING.

THE following letter contains data of interest to gas engineers generally, and consequently, in the interest of progress, we give it a place in our columns. The figures given are official, and the assertions made are, we understand, based on the result of actual practice:

OFFICE OF S. A. STEVENS & CO.,
87 ASTOR HOUSE, New York City, Feb. 29, 1876.

PRESIDENT —— —— GASLIGHT COMPANY:

DEAR SIR—I respectfully submit the following synopsis of figures concerning operations of the Lowe process at Utica, N. Y., during the four months ending December 31st, last.

The amount of gas delivered into the holder, for that period, was as follows:

For September	3,050,600
" October	3,745,000
" November	3,459,900
" December	2,878,900
Total	13,134,400 cubic feet.

The average quantities of materials used to produce a thousand feet were:

For September,	66⅔	pounds	anthracite	coal,	3 1-9	gallons	crude petroleum.
" October,	65 1-6	"	"	"	3¼	"	"
" November,	70⅓	"	"	"	3¼	"	"
" December,	67½	"	"	"	3 2-5	"	"

These averages are creditably close for a new method, with which the men were comparatively unfamiliar, but they are the more so in view of the fact that these works, being experimental, were erected without any data to predetermine capacity, and hence, in practical operation, it is found that two generators actually do the work for which it was supposed four would be necessary. The result has been that, with half the apparatus, gas has delivered so rapidly that the holder would fill, necessitating the frequent suspension of work and a consequent waste of fuel. On occasions when the process could be worked to somewhat unusual advantage, it was found that the average quantity of coal was proportionately reduced, as follows:

September 28, 49	lb. to 1,000 ft.	November 27, 51	lb. to 1,000 ft.
" 29, 47 3-5	" "	December 5, 51 4-5	" "
October 18, 52 4-5	" "	" 18, 44¼	" "

Being an average for these days of 49 1-5 lb. to the thousand feet. While these figures are of course exceptional, it is fair to present them as indicating the possibilities of the system when worked continuously, and upon a larger scale. And in this connection it should be stated that certain mechanical imperfections, apt to attach to first constructions under new principles, will be avoided hereafter, and their correction encourages the belief that a reduction of even these last figures may be relied on for daily results. For example: about one-third of the coal item has heretofore been used under the boiler, while heat enough has escaped up chimney, according to competent engineers, to make the steam. The gas has been given to the washer at a temperature of 1000° to 1200° Fahr., which may be utilized to heat the air blast, with further economic results. Practice has shown that three gallons of petroleum of say 46 gravity, is the maximum required to carburet a thousand feet of 19 candle power. The excess used during September and October, as shown by the table, was owing to the over-use of water in the washing process, whereby some illuminants were lost, and the larger excess in November and December, is more than accounted for by the fact that the Utica Company, during those months, were sending into holder about 40,000 feet daily, from their coal benches, at a grade of 10 to 12 candles, and relied upon the quality of the 100,000 feet made by the Lowe process to give the entire product a value of 19 to 20 candles. It may be remarked here, that the decision of that company to start their benches at that time was greatly regretted, as it gave occasion for unjust suspicion among outsiders.

Though this may have been partially remedied by their published official statement of reasons, the fact deprived the new process of the advantage which it had clearly earned, by their own showing, of making independently the maximum supply of the city. The circumstance, however, demonstrated positively the complete diffusion of the two gases.

In conclusion, the results at Utica fully testify—as a safe estimate for operations on a scale of 500 thousand feet for 24 hours—the following: four men on the shift, and for every thousand feet, 50 lb. anthracite, three gallons crude petroleum, one-fifth bushel lime. These items cover the entire cost (minus the greatly reduced one of wear and tear) of a 19 to 20 candle gas in holder, with reference to the quality of which it may be asserted that both practical experience and scientific analysis have demonstrated, beyond an intelligent doubt, its superiority over that made from coal. With a density of not over 571, it is shown to contain but one-fourth the tar, one-third the sulphur, one-fifth the ammonia, and two-third the sooty matter existing in gas by the old method. Yours, very respectfully, GEO. S. DWIGHT.

THE CLAUSTHAL WORKS.—No. 5.

(*Continued from Page 320.*)

Coarse Rolls.

Next in order of succession are the coarse rolls of which there are three in two different buildings. The one lies between the coarse separation and coarse jigging house, and the other to the north side of the coarse jigging house.

Fig. 10.

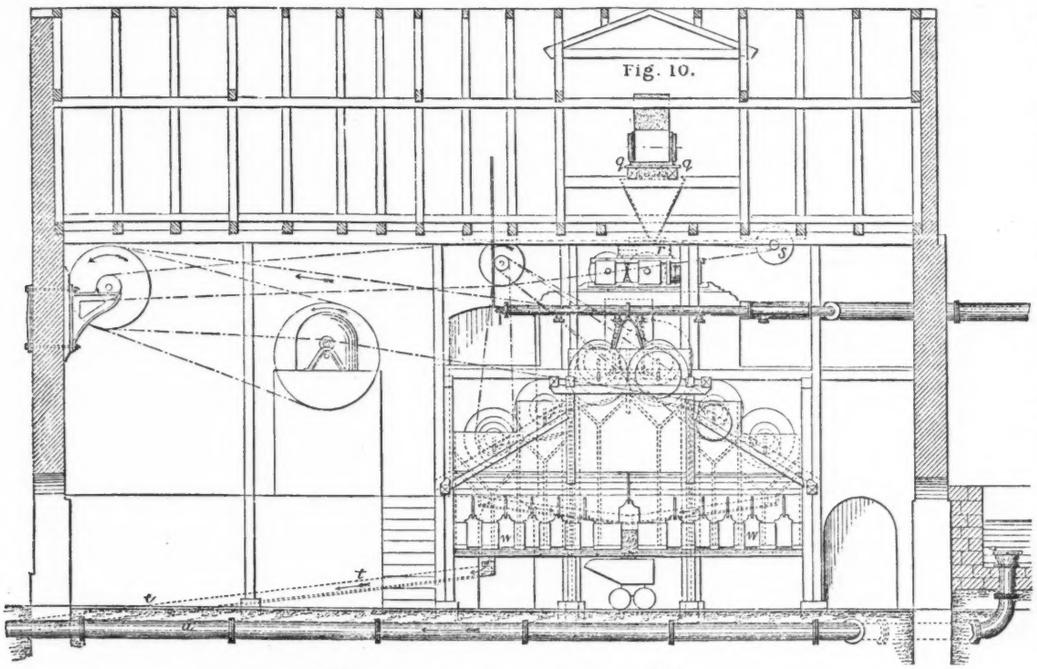
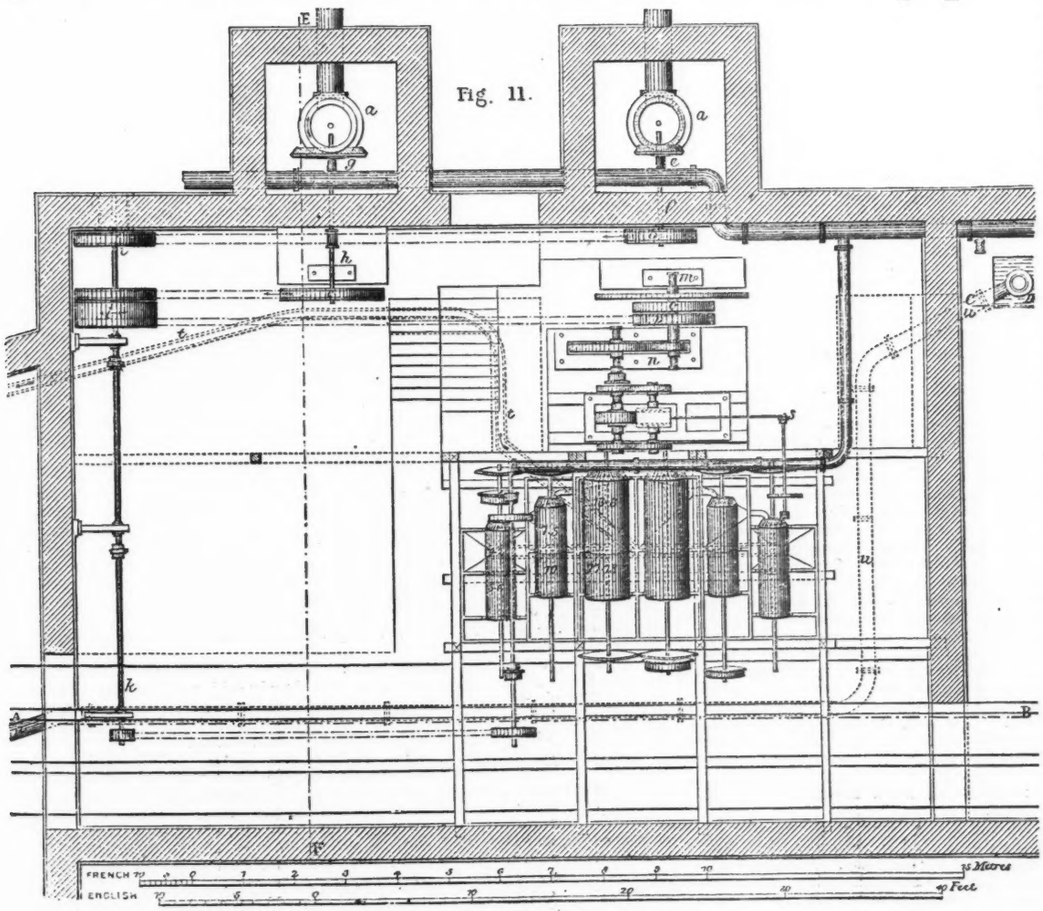


Fig. 11.



FIGS. 10 AND 11. ROLLS FOR COARSE ORE.

We have already mentioned why the three rolls have been placed in two separate buildings, and the reason for the present situation of one of them not in the same line of buildings as the coarse jigging house to which the products from the coarse rolls are next passed, as also how it comes to pass that the two rolls in one building are driven by a steam engine, and the other lying between the coarse separation and coarse jigging houses by water power.

As all these three rolls, together with the separating apparatus, are of exactly similar construction, we shall limit ourselves to a description of the single one driven by water power, which is represented in longitudinal section, plan, and cross section, in Figuaes 10, 11, and 12. The existing waterfall of 18 feet, is here employed for the turbines *a a*, Figs. 11 and 12, and also for the turbine employed to drive the coarse separation. As will be seen from Fig. 11 there are two turbines, one of which, according to the first design, was intended to drive a special pair of rolls. As both turbines were already laid down, when the increased requirements of the work necessitated the building of at least another pair of rolls driven by steam, the driving gear was so arranged, that the driving of the single pair of rolls could be effected by either of the two turbines, *a a*. How this is accomplished will be evident from Fig. 11. The driving shaft *i k* can be set in motion by belts either from the pulley on the shaft *e f*, or from that on the shaft *g h*, each of which is driven by means of bevel gearing from one of the turbines *a a*. The power is then transmitted to the countershaft *m n*, by means of a belt passing over the pulleys *l* and *o*, as shown in Figs. 11 and 12; *p* is the loose pulley.

The rolls, which are 30 inches in diameter and 12 inches broad, make 24 revolutions per minute, which may appear too much to some of our readers, and as it is only experimental, may, perhaps, require to be altered according to results. The rolls, as shown in the detail views, Figures 13, 14, and 15, consist of a conical cast-iron seating, on which a corresponding conically bored out rim or tyre, 2½ inches to 3 inches thick, is fastened by means of a screw and nut. The rim is made of cast steel forged, and afterwards turned, or is a chilled casting and used unturned. The rolls are kept pressed together by means of india-rubber collars *c c*, Figs. 13 and 14. The rolls are connected and caused to revolve simultaneously by means of the four-toothed wheels M M M M. The teeth of these wheels are very long, the curves of the gearing surfaces being in volutes, which, as our readers will know, allow of the distance between the two centers of the wheels being altered, which in the case of rolls is constantly taking place. A flywheel A is fixed to the shaft *m n*, and also a spur wheel B, which gears into C fixed on the shaft *q r*. At the end of the shaft *b r* is fixed a coupling *s*. In Fig. 15 the rolls are shown coupled, and in Fig. 14 uncoupled. The coupling is so designed that it will give way before one of the teeth on he wheels M M, if a hard body gets between the rolls. The arrangement has given every satisfaction. It will be seen from Fig, 13 that the brass bearings are arranged so as to suit the direction of the greatest pressure between the axles of the rolls and the bearings. The rolls 1 and 2 with their axles are capable of being reversed end for end in their bearings, so that the end B may be coupled to the axle *q r*. The bedplate D can also be reversed in direction.

We shall now return to the series of operations. The ore to be crushed is transported by means of wagons on the rails *q q*, Figs. 10 and 12 (which are on the same level as the tip-ground), either from the tip-ground or direct from the upper-lying sorting house, as we have already remarked. In consequence of the relatively great distance which the ore had to be transported (*i.e.* from the upper-lying sorting-house or tip-ground) there was the liability of the rolls running empty. To avoid

this, however, the hoppers were made of such large dimensions, that there was not room to provide, in the usual manner, a feedroller between the hopper and the crushing rolls, as we shall further on see is the case with the middle and fine crushing rolls. It was, therefore, necessary to use some other arrangement for a regular and gradual feed, which should not take up so much space as regarded height. The arrangement consists of an horizontal sliding plate at the bottom of the hopper, this plate moving to and fro in a cast-iron box *r*, Fig. 10, the motion being imparted from a small crank (the length of which can be varied) on the shaft *s* by means of a small connecting rod. We shall meet later on with a similar apparatus in connection with the stamps. Alongside each crushing mill are two sets of separating apparatus, exactly similar in size and construction, each consisting of three riddles, to which the crushed ore is led, being on its passage pretty equally divided between the two by a sheet-iron tongue fixed in the conducting channel. The riddles are cylindrical with inclined axes. Their construction otherwise is similar to those we have already described. The two larger ones which lie uppermost are 7 feet 10 inches in length and 3 feet in diameter, the four smaller ones are 6 feet long and 2 feet in diameter. The riddles are provided with holes from 0·7 inches to ·166 inches, as shown in Fig. 11, corresponding to which we obtain the following sizes:

		in.		in.
1.	From	0.7	to	0.524
2.	"	0.524	"	0.394
3.	"	0.394	"	0.295
4.	"	0.295	"	0.221
5.	"	0.221	"	0.166

which, like those from the coarse separation, are next transferred to the coarse jigging machines.

Although the rolls are designed to crush the coarse ore to 0·7 inches, still there will always remain even by the most careful adjustment of the rolls, pieces of ore above that size, which even when the rolls have been worn for a short time fall through in no inconsiderable quantity, and of such a size that not only can they not be passed on to the jigging machines, but also that they would have a detrimental influence on the proper working of the middle and fine rolls which follow next. They are, therefore, raised and recrushed.

The sizes Nos. 1 to 5 of the foregoing list, which are destined to be afterwards jigged, fall into separate underlying receivers, from which they are from time to time drawn out into wagons and transported to the coarse jigging house.

As would be naturally expected, besides the above mentioned sizes there will also be a small quantity below 0·166 inches, and indeed down from this size to a very fine state of division, which like the produce of the same size from the coarse separation can be immediately transferred to the fine jigging house, after having been separated in a corresponding manner. For this latter purpose the finer products are drawn off in the channel *t*, and led through the coarse jigging house to a fine separating apparatus in the middle and fine crushing house, to which we shall refer later on in its proper place.

With reference to Figs. 10 to 12, we may yet remark that the piping *u* is the same as that marked *s* in Figs. 4 and 5 (see page 295), through which the cleared water from the basin *r*, Fig. 5, in the upper floor of the coarse separation building is led to the lower-lying portion of the dressing works.

With the exception of the matter noticed in this last remark and such alterations as are required by the situation and the difference in the motive power used, everything in connection with the coarse rolls driven by steam is exactly similar to those we have been describing driven by turbines.—*Engineering.*

TO BE CONTINUED.

THE BROWN COALS OF UTAH AND ADJOINING TERRITORIES.*

By H. Engelmann, E. M., La Salle, Illinois.

THE very extensive development of a brown coal formation, in the region of the Rocky Mountains, is well known to all of you. The existence of these coals was known years ago, but they were of no practical importance until within a few years, when the mineral wealth of that country began to be developed and railroads were built. As their qualities became better known, their adaptability to domestic manufacturing and metallurgical purposes is more appreciated. They are still much undervalued, although they are mined at some points on a very extensive scale. A large portion of this coal formation is of Cretaceous age, while it appears to extend into the Tertiary epoch; but whatever difference may be in the age of these coals of different localities, they all have some common characteristics which distinguish them from our eastern stone coals of the Carboniferous age, which some of them otherwise resemble so much that even professional gentlemen have been led to very erroneous conclusions in regard to their coking qualities and adaptability as blast furnace fuel with our present appliances, barring future inventions, not to speak of the glowing reports of over-sanguine promoters of dazzling schemes.

These brown coals range in their properties from the perfectly dry sand coal which shows not the least sign of caking in the strongest heat, but rather disintegrates in the fire, through all grades of sinter coal—which two classes appear to comprise the preponderating mass of these coals—in a few instances to the caking coal, and on the other hand to anthracite, which latter appears to be formed locally from such coals by the influence of erupted masses of igneous rocks in New Mexico. As types of these classes I will enumerate some coals on which I have experimented to some degree: The type of a *sand coal* is the coal from the *Crismon Mine*, on Weber River, southwest of Evanston, on the Union Pacific Railroad. An average sample gave 54·9 per cent. coke, including 4·5 ash. The coke was not at all caked, but consisted of loose grains retaining their original shape unaltered. This coal, which emits ammoniacal gas in coking, like the rest, also slacks quickly when exposed, and has the excellent quality for domestic use which is common in European lignites, that it retains the fire for a very long time, smouldering under a cover of ashes, without requiring any special precaution. Its smell, when burning, is also the characteristic one of the European lignites.

A slightly sintering coal is that from the Van Dyke Mine, at Rockspring Station, on Bitter Creek, Wyoming, on the Union Pacific Railroad. An average sample gave 61·4 per cent. coke, including 4·2 per cent. ash. It slacks less by exposure than the foregoing coal; is a very fair blacksmith coal. It has in part a resinous luster and sub-conchoidal fracture and a somewhat laminated or shistose structure. In the fire the pieces open out as if a closed fist was opened and the fingers stretched forth. In a very hot fire as melting of the coal takes place in the interior of the mass, while the outside remains loose.

A stronger sintering coal is the Wales coal from REESE'S Mine, San Pete Valley, Utah, but it is by no means a caking coal, as we will see below. From different portions of the bed I obtained from 68·0 to 72·2 per cent of coke, including 12·8 to 16·0 ash, which corresponds to from 56·4 to 59·5 per cent. of fixed carbon in pure coals, and from 18·8 to 22·6 per cent. ash in the coke.

A slightly caking coal (schwach-backende kohle) is that from Coal Creek, near Cedar City, Iron County, in Southern Utah, of which I had specimens, and an evidently trustworthy account through Bishop LUNT, of Cedar City. It resembled much the Van Dyke coal in appearance, and gave from 59·0 to 61·3 per cent. coke, including 5·2 ash. In a crucible it cakes well, yet its caking capacity is much less than that of Indiana block coal.

A strongly caking coal is that from Trinidad, Col., of which I obtained specimens through the kindness of Prof. PRIME, Jr., Mr. A. EILERS, and Superintendent FAY, of the Denver gas works. Different samples of it gave from 72·7 per cent. coke, including 7·5 ash—equal to 67·43 per cent. of fixed carbon in pure coal—to 77·8 per cent. coke, including 11·4 ashes, corresponding to 71·2 fixed carbon, and even 90·75 per cent. coke, including 29·34 ash, corresponding to 82·7 per cent. fixed carbon in pure coal.

The anthracitic brown coal, of New Mexico, I have never examined.

Analyses of many of these brown coals prove that their calorific value and pyrometric effect, need not be inferior (see a paper by our former President, Mr. R. W. RAYMOND, read at a meeting of this society in 1873). I must, however, state here, that many of the analyses which have been published, are not made from average samples, but from select pieces. Various published analyses of the Evanston coal for example, would indicate that it was an article of superior purity, while in reality the coal shipped from Evanston to the Salt Lake market, during my stay in Utah, was so very impure that it had to be sold far below the price of the Weber River coal, in order to find a sale.

At a meeting of this society in 1872, our friend, A. EILERS, read a paper, in which he very justly pointed out the propriety of using gas producers with step-grates for these coals. For many purposes the sinter coals amongst them merely require a large grate surface, with narrow openings between the bars, and do well with the forced draft created by means of the exhaust steam; but even the driest sand coals amongst them are an excellent fuel, not only for making steam, but, for all kinds of reverberatory furnaces used in the treatment of ores and metals, iron included, if burnt in gas generators in the proper manner. Where the most intense heat is required, it may possibly be advantageous to free the gas thus produced of its aqueous vapor before igniting it, in the same manner as blast furnace gases are, at some works, dried before using them in reverberatories. I myself built a small and crudely constructed gas producer for such coals early in 1873, in connection with experiments on the coking of these brown coals, as far as I know, the first ever built in Utah. The heat created was at any rate sufficient to bring my experiments to an untimely close, by fusing the Colorado fire-brick of which my furnace was built, and which were not exposed to chemical action. I have seen it stated that at Georgetown, Col., such coal is used as fuel in a pulverized state at one of the metallurgical establishments, but having for many years been familiar with the use of gaseous fuel, made often from all sorts of refuse, I confess myself a great admirer of its operation, and doubt whether pulverized fuel can possibly be adopted with equal advantage. Many attempts have been made to coke these brown coals, which with the driest qualities have proved entire failures, with the slightly caking ones an indifferent success. The cause of the ill success is to be found not merely in the dryness of the coal, but even more in their very great shrinkage during the process, which causes them to break up; and in the great density of the resulting fragments which often look like pieces of a hard gray slate, require a high heat and strong pressure of blast for ignition, and cause so muddy a smelting that the resulting losses far outweigh any possible gain.

My experiments with these coals; especially in regard to their caking quality, have been mostly made during a prolonged stay in Utah. They have been quite extensive. I began on the smallest scale with a platinum crucible, then I worked by the pound, and finally by the half ton, in a furnace especially designed and built for the purpose. In the platinum crucible all the western coals which I examined, showed a most characteristic difference from the stone coals of the Carboniferous formation. After coking, the surface of the latter, which had been in contact with the sides of the crucible, was of a lusterous jet black, that of the western brown coals invariably steel gray, even that of the coke of the highly bituminous Trinidad coal. The quick heat obtained on a very small scale causes some otherwise dry coals to cake more or less in the crucible, which cannot be made to cake by any heat which can be profitably applied in practice on a large scale. In such comparative experiments, the different samples must be of uniform size of grains; equal quantities must be used, and the heat must be the same in all experiments of the same kind. For the following tests I used first, pieces of from one-tenth to one-quarter inch sides in a platinum crucible; then the same powdered, which gives still more characteristic results, and suggests important conclusions; then single lumps with one-half inch sides on a platinum dish, which show other properties of the coals in a characteristic manner; finally I tested the relative binding or caking capacity of the coals, by mixing equal weights of each with such weighed quantities of fine quartz sand, that after coking the cake would just bear a certain uniform weight without being crushed. The units of sand which the unite of coal is able to bind, indicate its caking capacity. These latter numbers are only relative and vary with the heat employed, the varying quality of the sand, etc.

These tests gave the following results:

1. *The Weber River coal* showed, as I have already said, not the least trace of caking. The single grain remained perfectly loose in the crucible (also in the highest heat of an assay furnace). It merely shrank in volume. The coal from the *Hinton Mine*, near Evanston, showed hardly more caking.

2. *The Van Dyke coal* from Rockspring Station, on Ritter Creek, Wyoming Territory, which I have before mentioned as slightly sintering. *a*, in grains: It requires a little more time for loosing all its gas than caking coal in the same heat, viz., ten minutes; shows only some fluxing in the center of the mass; all around this central portion the single grains protrude, are somewhat rounded at their edges, and sintered together wherever they touch each other; color on outside, dark gray. *b*, In powder: Time required, 12½ minutes; coke slightly coherent, especially towards the center, while the outside portions are almost loose powder; outside color, gray. *c*, On platinum dish a lump retains its shape, —does not become spongy—cracks in all directions—part of it exfoliates so that the pieces spread apart at one end, remaining united at the other. *d*, Caking capacity not especially tested, is evidently zero. Larger samples of this coal, coked in an assay furnace with high heat, were also fluxed in the center of the crucible, while the outer portions were as described before.

3. The coal from *Reese's Mine*, near Wales, San Pete Valley, Utah. This coal placed in grains in the platinum crucible gave a well fluxed coke forming a

* A paper read before the American Institute of Mining Engineers, at the Washington Meeting, February 1876.

porous mass, while larger pieces fused only partially, and some of the coke was not changed in outline and showed a dense slate-like texture, which proved that this coal is still a sinter coal. Its percentage of ash is very high, as we have seen above, even after the most careful picking. The color of the coke where it touches the crucible is gray, and it is also shrunk considerably. The coking capacity was not tested, nor the regular series of tests made.

4. The coal from *Coal Creek*, near Cedar City, Utah, cakes considerably more than the Wales coal. *a*, In grains: It takes ten minutes; the coke is fluxed and porous throughout, but little spongy, and not as hollow as from the following coals. On top it is flat, not raised, and the single grains can still be recognized on the surface. Against the sides of the crucible it is somewhat rough, the single grades are well rounded off but are plainly to be seen—a sinter coal. The surface against the sides of the crucible is shining dark grayish. *b*, In powder: Time, 12½ minutes. The coke shows only traces of hollowness, and a corresponding small protuberance on top. It is porous, somewhat shrunk, and breaks readily, in consequence of the tension produced by the shrinkage. Its surface is not saining black but steel gray, and shows distinctly the single fine grains of coal. *c*, On platinum dish a lump retains its shape very nearly, but cakes and becomes porous inside. It possibly expands a little, but the tension thus created renders it weak. *d*, The caking capacity of this coal was found to be 5½. By comparing this coal with the Indiana and Illinois block coal (of which below) it will be seen that it promises well as a *blast furnace fuel in it's crude state*, being less caking than the block coal, yet sufficiently so to enable it to bear a burden. The purity of this coal, and the occurrence of excellent iron ores in large quantities in its vicinity, give it additional importance. *It can also be coked with proper appliances*, although it is not exactly a well caking coal, but stands on the line between caking and sinter coals. It appears, therefore, destined to become the furnace fuel of Utah, for which purpose it is far better adapted than the San Pete coals; as far as I have seen the latter, which is in comparison but a poor make-shift, which would not be used at all if good coke and charcoal were not so excessively high in price, in consequence of the distance they have to be carried by rail.

5. The coal from Trinidad, Southern Colorado (samples of which I obtained, as stated above). The different pieces varied somewhat in appearance and behavior, and evidently represented different portions of the same stratum. Together they probably closely approximate an average. *a*. In grains: time from 8½ to 9½ minutes. One sample swelled far out of the crucible, coke perfectly fused, hollow in the center; against the sides of the crucible it is shining and of a grayish black. Another sample boiled up less; coke also hollow in center, but denser, and not quite so completely fused on outside, although perfectly caked; color of outside, grayish, and less lustrous. Still another sample was intermediate. *b*. In powder: time 9½ to 11½ minutes. The first sample swelled high up; coke hollow, otherwise finely porous, outside shining gray. The second sample swelled somewhat, corresponding to a small hollow in center of coke. Top of coke flat, uneven, gray; surface against crucible gray, more dull than shining. *c*. On the platinum dish a lump of first sample swelled up, fused and caked, and lost all semblance of the original piece. Another lump of the same, at first exfoliated in the manner described with the Van Dyke coal, as if a closed fist was opened and the fingers stretched apart, but soon the whole softened and ran together completely, forming a very porous coke. Of the second sample one layer at once boiled up and fused, while the next layer first cracked in every direction, and then caked, forming a coke which resembled in outline the piece of coal, but was hollow, not however as porous as the first. *d*. The coking capacity of the driest part of this coal—which gave 90·75 per cent. coke, including 29·34 per cent. ashes—was 6, while the most bituminous part showed a caking capacity of 9, not far below that of the Pittsburgh, Pa., gas coal. This, then, is a strongly caking coal.

For comparison I will now cite the behavior of some stone coals:

6. The *Brazil* (Indiana) *block coal*—the date in regard to which, may be also applied to the *Murphysboro* (Illinois) *block coal*—*a*. In grains: time from 8½ to 9 minutes; coke hollow, spongy, with protuberance on top; outside against the sides of the crucible quite uneven, not absolutely fluxed, with brightly shining black color. *b*. In powder: time 10½ minutes; coke hollow, spongy—top raised somewhat, and more dull than bright in color—surface next the crucible black but not as brightly shining as with the more caking stone coals. *c*. On the platinum dish a lump is changed considerably in shape, in consequence of tar boiling out and caking on the surface, yet the original shape can readily be traced. The laminated structure can still be seen, but the laminæ swell somewhat. It is only when the pieces are crushed fine so that the single laminæ are much broken up, that the coke fuses well together. We can often see that the upper and under surface of a lump remain unbroken, while the tar boils out at the sides. If such an unbroken surface touches a corresponding one in the coke-oven cementation is apt to be imperfect. *d*. The caking capacity is 7. This coal is therefore by no means as dry a coal as is frequently supposed. If there were any necessity for it, it might be coked quite readily with proper management.

7. *St. Clair County* (Illinois) *coal* from the St. Louis market. It was taken from the middle and upper part of the vein which is purer and better than the bottom part. *a*. In grains; time 9 minutes—coke hollow, spongy, with pitchy protuberance on top. The surface against the crucible shows some unevenness from not absolutely complete fusion, and is bright shining black. *b*. In powder: time 10½ minutes—coke hollow, spongy—top raised somewhat but rather flat—surface against crucible smooth, shining black. *c*. In the platinum dish a lump puffs up and cakes and forms a swollen mass which bears no resemblance whatever to its former shape *d*. The caking capacity is 8.

8. *Gas coal* from vicinity of Pittsburgh, Pa—mine unknown—obtained from the St. Louis gasworks, a hard, very solid coal with subconchoidal fracture and resinous luster, giving from 60 to 67 per cent. coke, including from 3·5 to 5·5 per cent. ashes. It was only tested as powder. Time, eleven minutes—coke swelled high out of the crucible, quite hollow, spongey, with smooth shining black surface. Caking capacity, 9½.

From these comparative tests we see that there is a marked difference between the brown coals and the ordinary stone coals. The surface of the coke, when they are treated as powder in the platinum crucible, is invariably gray on the side in contact with the crucible, while the coke of ordinary stone coal is shining black. Further, even in the most bituminous of the brown coals, the tendency to exfoliate shows itself occasionally, and in the ordinary ones it is strongly developed. With rare exceptions, the brown coals shrink much in coking, which causes them to split and break up. Moreover, even the caked portion, where caking takes place, is generally less porous, more dense than ordinary coke, and in many instances part of the coke has the appearance and texture of a hard compact slate. All the samples tested, which were far more numerous than I have enumerated above, with the single exception of the Trinidad coal, was considerably less caking than the Indiana block coal, and most of them showed no caking of note. Also, with the same single exception, they required a longer time for the evolution of their gas than the stone coals tested for comparison. This may be due to their shrinkage whereby the transmission of heat may possibly be retarded

On a large scale, such quick and intense heat as the coal receives in the crucible, where the whole process is finished in a few minutes, cannot be practically employed with profit, and therefore any attempt to coke the slightly sintering brown coals, even with improved ovens, without addition of foreign substances must fail, the sand coals being entirely out of the question.

The supply of a cheaper fuel for the lead blast furnaces of Utah and Nevada has been a very important problem, the cost of eastern coke and western charcoal being enormous and the supply rather uncertain. Since the attention has been directed towards the more strongly sintering brown coals, and railroad transportation facilities have been extended, and are extending more and more, this problem approaches a solution. How far the present attempts at coking the San Pete coal are practically successful I am not aware. Even a small percental production of serviceable coke might prove an advantage if their quality be not such that the percental losses of metal are too much increased by their use in the copulars. Some of the best coals of this kind can probably be coked by using very narrow and high ovens, heated by burning the gases in the partition walls, similar to the COPPEE furnace. Such ovens have been used in Europe for dry coals of a width of a little over 10 inches. The proper width of a coke oven has, however, to be determined by experience for each kind of coal. A too narrow oven produces more small trash; a too wide one does not allow the heat to penetrate with sufficient rapidity.

The APPOLT vertical oven may also prove serviceable, or where a higher, especially a higher initial heat, should be desirable, my method of using simultaneously with the coking gases in the flues of the oven, gases obtained from a distinct powder (for which process I have taken a patent) might prove of advantage. This method was suggested by the result of the experiments with the slightly sintering coals. These experiments I have never been able to carry to a definite issue, having been called to a different field of usefulness; but I have obtained some results which may prove interesting and useful. In these experiments I principally used the Van Dyke coal because it was the best coal which I could readily obtain at that time.

I first tried an admixture of tar, as it is used in the manufacture of briquettes, but found that the percentage required would be too great and expensive. Tar leaves very little coke, and therefore does not mend the shrinkage of the coal. In small proportion it may prove useful, conjointly with an addition of caking coal, especially for binding the coal dust. Then I used caking coal as an addition with much better results, and found the very best the most profitable. Its swelling, in a measure, corrected the shrinking of the brown coal. The combination of well coking coals with drier ones in coking, is by no means new. Many years ago it was the established practice in the Saarbrücken District, in Western Germany, to mix, in coking, the coals from the more bituminous state with that of the little bituminous ones. A few years ago, extensive and successful experiments were made to utilize dry Austrian coal in this way; and even anthracite slack can thus be coked. The important question in our case was how much of the caking coal would be required, or rather with how little an amount of its cost—the desired result could be obtained, and by what means this required percentage could be decreased. As I have said, my experiments did not result in a positive conclusion, but I am led to think that 1-5, or at the most 1-4, of the whole mass might be made to suffice with such coals as the Van Dyke, if high heat was employed in the process. The brown coal was to be crushed fine in order to obtain uniformity in the product, but while the larger pieces will remain whole, and form a solid wall, the crushed material refuses to re-unite in the oven. The finer the crushing, the more binding material is therefore required. On the other hand, a certain proportion of fire is necessary to fill the otherwise empty spaces between the coarser grades. Especially for binding the fine dust, a small addition of tar may prove useful. The presence of moisture which, with coking coals prove useful, appeared to have a bad effect by its cooling influence at the start, and a high initial and sustained heat, appeared indispensable, otherwise the coke lacked solidity. I also tried to obstruct the outflow of the coking gases, hoping thus to retain and decompose more of the tar, inside of the charge; but I found my appliances inadequate, and various difficulties presented themselves. I now expect more from collecting the tar outside of the furnace, and mixing it to the charge while heating the furnace with the remaining gases, to which gases, from a separate producer, are added to increase the heat. A high narrow oven, and compacting the charge in the oven immediately after charging, will apparently be essential for success.

With my crude appliances, and while testing various charges, part of which were never expected to give a serviceable coke, but were made to study the influence of certain mixtures or manipulations, I obtained some rather fair coke of uniform porous texture and columnar structure, which ignited readily, and were bought by a foundryman, at Salt Lake City, and gave good results in a small cupola with weak pressure. They were still too soft to bear transportation, and the percentage of trash was too great. They were obtained from 80 parts Van Dyke coal, with 20 parts Pittsburgh gas coal. Such coke, a little more solid, would be excellent for smelting the silver-lead ores. Some pieces were exhibited as a curiosity, not as samples of what may ultimately be obtained. Often, however, I found such a tension in the product of my oven, especially when water had been used for cooling it, that the trash, when thrown on the fire, would decrepitate with loud reports, which would continue for a long time.

ASBESTOS POWDER.—Asbestos powder, made into a thick paste with liquid silicate of soda, is used with great advantage for making joints, fitting taps, and connecting pipes, filling cracks in retorts, etc. It will be found to be of great service in the manufacture of nitric acid, sulphuric acid, and other products, because it can be employed in a very easy way; it hardens very quickly, stands any heat, and prevents the escape of acid vapors. Mr. JOHN CASTHELAZ informs us that he has used it for about twenty years, but he recently found that its use for the above purposes was unknown to several prominent manufacturing chemists. They have since adopted it, and are highly satisfied with the results.

SULPHURIC ACID.—By the invention of Mr. F. C. BURNARD, of Plymouth, the nitrates are not decomposed in pots or ovens, nor is the nitrous acid vapor or gas permitted to commingle with the sulphurous acid gases of the burning brimstone of pyrites before the entry of such gases into the de-nitrating towers, but the requisite quantity of the nitrate is introduced directly into the circulatory system of the process—that is to say, either into the acid on the floor of the chamber or into its atmosphere, or into the absorbent or nitrating tower, or into the de-nitrating tower, or into any intermediate vessel in connection therewith, and either in a dry powdery state or in the state in which it usually exists in commerce, or in a state of solution.

SHRINKAGE STRAINS IN CASTINGS.—NO. 1.

By Alfred E. Watkins, M. E.

SHRINKAGE strains in castings being a subject but little understood by the general class of moulders and machinists, a few hints upon the subject might prove of interest; and, although I do not claim that the theories advanced are absolutely correct, they are sufficiently strong to stand alone till a better is offered. There having been but little, if anything, published on the subject, the writer has been obliged to depend entirely upon his own observation, and that of moulders of long experience; hence, for some of the effects which have not worked out according to the theories advanced, I am assured the practice and theory *would* have coincided if the experiment had been carried out upon a more extensive scale. To facilitate the work, it is best to divide the explanations under headings, and will open with

PULLIES.

Many machinists and founders have noticed, if a piece be broken from the rim of a pulley, that it cannot be returned without forcing the gap open, showing that the rim had been put under a strain which caused it to close together so soon as the piece was removed.

The strain here exemplified may be explained in the following manner:—So soon as the pulley is cast, the rim (which is the thinnest) is cooled off by the walls of the mould, and sets immediately. The arms, containing more metal in a mass, cool next and sets. The hub, containing the most metal in a mass, cools last and sets, but in so doing, like all the rest of the metal, has a tendency to contract from its moulded size. It is now easy to see that the shrinkage of the hub will have a tendency to separate itself from the arms, or these from the rim, hence the strain upon the rim is of such a nature, as to cause it to close together, and form a circle of less diameter than is natural. When the piece is broken out, the strain relieves itself by drawing the rim together. To overcome so much of the evil of this strain as possible, it is usual to curve the arms, which, by straightening somewhat under the influence of the strain, renders them less likely to be broken.

In the case of locomotive drivers, the above was practically demonstrated by some of the leading shops which found themselves obliged to insert a core between every second or third arm, to secure sound castings.

RINGS.

If a piece be broken from a *ring*, no perceptible change of form will take place, the piece can be returned quite readily, and will be found to fit; this, however, does not prove that there is no strain present; on the contrary, we will show there is.

When the ring is first cast, the walls of the mould cool off the inner and outer circumferences, immediately causing them to set, the central core of metal remaining yet hot; in a few moments more it sets, and in shrinking exerts two influences—one to reduce its own diameter and that of the outer crust to which it is attached, and which has already set; and the other, to crawl around in the direction of the circumference, whereby, with reference to the outer crust there is a tendency to close together; yet, with reference to the inner crust, there is a tendency to open outward. Hence, if the ring be put in a lathe, and the outer crust removed, the gap will be noticed to close in, increasing in this tendency as we near the center of the ring with the tool. As we progress toward the inner crust from the center, an opposite effect will be produced, and the gap will be noticed to open. In a ring of twenty-seven inches diameter, turned till the outer crust was just removed, when the piece was removed, the ring closed together 1-32d of an inch in four inches—two prick-punch marks having been made on its edge four inches apart, spanning the place where the piece was to be removed, and before any cutting was done.

CYLINDERS

Are no more than deep rings, and the strains explained under rings are also present here.

Ordinance and cylinders shrunk on the RODMAN plan will have a tendency to spring open if a piece be broken out, for the following reasons:

By the use of the water core, the interior of the cylinder is cooled first and set; as the material surrounding this central core shrinks, it has a tendency to crawl around (as explained under the head of rings) exerting a strain upon the outside—by outside I mean the portion surrounded by the molten metal—of the skin about the core barrel, which strain has a tendency to pull the skin back, or to rupture it; this force is increased as we approach the center of the section, then retarded and counteracted by the shrinkage of the exterior surface, caused by the refrigerating action of the walls of the mould. This refrigerating action is small when compared with that of the core barrel, hence the tendency to spring open will be somewhat greater than the tendency to spring shut. Therefore, a broken section will always spring open, the tendency being regulated by the greater or less rapidity with which the outer surface is cooled off.

These strains upon rings and cylinders would (if the metal were free to act after the piece was broken out) from an inverted triangle in the face of the broken section, the apex being in the center of the case supposed under the section on rings; while in the case of the RODMAN plan, the apex would be nearer the outer edge, and in a perfect case, should lie just within the outer crust. It is, therefore, best to cast hydraulic rams, cannon, and all other cylinders intended to withstand great internal force, on the RODMAN principle.

Cylinders, with heads cast in, whose thickness is greater than that of the body of the cylinder, will be found to caliper less at the ends than at the middle, owing to the heads, acting as the arms in the pulley, exerting a strain inward, drawing the ends of the cylinder down with them.

If the heads be cast *thinner* than the body of the cylinder, the cylinder will be found hollow in the middle, owing to the heads setting first, which act as props or pillars, hold outward the ends of the cylinder, while the body being free to contract, will shrink its full allowance.

TO BE CONTINUED.

NEWBURYPORT, MASS., SILVER-LEAD MINES.

TO THE EDITOR: Sir—In my letter of March 20 I gave account of eight mining works of this district, but it must not be understood that these are "all." The "Bartlett Mine" is in Rowley, some six miles south of Newburyport. A shaft has been sunk 60 feet, with cross-cuts north and south. Vein dips northerly, about 50° from horizontal. The ore is exceedingly rich, being a large proportion of tetrahedrite carrying as high as 12 per cent. silver, and also with pronstite and other silver sulphides. The veins are narrow, but with good management ought to yield well. The mine has not been worked during this winter, but may be started up again with good weather.

The "J. M. LITTLE" property, in Newbury, has a shaft sunk about 40 feet, with a drift some distance, on a vein carrying galena fit for concentration, but at present the proprietors, Messrs. KIBBE & SHATTUCK, are devoting their full efforts to finding the south vein, which carries beautiful tetrahedrite and gray silver ores, as the broken ledge testifies; but it lies under a swampy tract, presenting some difficulties in development.

Much the same state of affairs obtains on the "Ambrose" property in Newbury (Byfield), some eight miles from Newburyport. Here a field of some 30 acres, mostly swampy, is filled with broken ledge and boulders carrying large masses of tetrahedrite and gray silver ores [stromeyrite (?)] of great richness. I should think that enough float ore has been dug out of late to pay the cost of the cross-cutting. The vein has not yet been found "in place," but operations to that end are being "pushed." Dressed ores from these "floats" assays about $4,000 per ton, and a good fair sample of broken boulder I got, assayed me 76½ ounces silver per ton (2,000 lb.)

The "Georges" Mine, situated in Newbury, about ½ mile northwesterly from the "Four Rock" and "Gilberg" Mines, is just getting "under way." Here, at the depth of three feet below the grass roots, a vein some 10 feet wide in place was shown, one band of which, some two feet wide, carries richly of the gray silver and tetrahedrites, while the remainder of the vein carries a high percentage of argentiferous galena, with occasional streaks of the higher grades. I understand this company is about erecting ore dressing works.

In Georgetown, some 10 miles from Newburyport, is the "Taylor" Mine, which has been worked some six months, two prospecting shafts having been sunk, with very good developments. The general nature of the vein is like the "Georges" mentioned above, although not yet showing as rich.

The "Rowell" Mine, is in Amesbury, Mass., north of the Merrimac River, and is the only mine now working in that town. Shaft about 40 feet deep, and with a fine show of galena ore. This mine is in the central part of the village. A prospecting shaft is being sunk at Salisbury Point, on a vein which outcrops under tide-water on the river, and has been sunk some 30 feet, striking the vein, and is to be continued deep enough to allow of drifting under the river.

Enough for this time. I propose to give further details at first opportunity.

MASSACHUSETTS, March 31, 1876. 922.

CARIBOU HILL, COLORADO, MINES.

Special Correspondence of the Engineering and Mining Journal.

IN my previous letter I mentioned the east and west running veins on the Caribou Hill, which are regularly worked. Besides these there are a good many other east and west running lodes, which are only worked during summer time with more or less success. They are the Grand Republic, the Elizabeth, the 5-30, the 7-30, the Black Warrior, the Topsil, the Hidden Treasury, and some others.

The east and west lodes on the Caribou Hill are in general very expensive to work, on account of the hardness and toughness of the vein matter and the still harder country rock. If these veins are very small, as the most of them are, the ore must be very rich to make the exploitation, even on a large scale, pay. Those worked on a small scale have never taken out ore enough to enable the owners to do much dead work and open their properties. If a rich pocket is struck in the first sinking it is drifted on, but after exhausting it, the drifting is given up and the mine stands idle till the owners, most of them miners, finally make up their minds to sink deeper, either to hold the property if not already patented, or to find another pocket and try to make a sale. These small veins, however rich in ore, can be worked only to advantage in connection with other veins. By the many cross courses and cross lodes on the hill these smaller veins can be reached with little expense from the levels on the main lode. Where, by so doing, a pocket or chimney of ore on the smaller vein is struck, this could be taken out and the broken stuff passed through the cross vein and the levels to the shaft on the main vein. Consequently cost of shafting and much dead work should be evaded, and in this manner might yield a profit. Higher on the hill and on the southern slope are also a good many east and west running veins. As far as they are developed, which is in general very little, they appear to be less rich in silver ores than those on the northern slope. These veins are, however, much thicker. Among them may be noted the Wabash, the Mount Vernon (decidedly a main vein), the Golconda, the Grand River and a good many more of which little more can be said than that they are located and duly recorded. There is on the Caribou Hill another prominent group of veins running north-east and south-west. They are abundant on the northern slope of the hill, where they are found in nearly every 50 feet. They are younger than the east and west veins, which they cross and fault in many instances.

A peculiar fact observed, is that these north-east and south-west veins are not very rich in themselves, but where they cross east and west veins they impoverish them, and carry the mineral for some distance themselves. This makes these north-east and south-west veins valuable. Another favorable peculiarity is the softness of the crevice matter; usually a decayed feldspar and quartz. This contains finely disseminated decomposed silver ores and small particles of native silver; it often assays from 40 to 60 ounces in silver to the ton. Where this stuff occurs in the vein, it is generally a sign of the proximity of sulphurets of silver and fine-grained galena, accompanied by limespar; a vein material that is not yet found in any of the east and west veins on the hill. In general, these crossing veins carry but little copper pyrites, while these are always found in the east and west veins, where they often contain 8 per cent. of silver. The most prominent of these north-east and south-west veins is the No Name, worked without interruption since its discovery in 1870. Last year it was bought by some Eastern gentlemen who own also the Sherman lode. Up to this time, only the western part of the Sherman, and the south-west part of the No Name have been worked.

The value of the No Name is not proved so much by its own exploitation, now at a depth of nearly 350 feet, as by the Caribou mine, which has cut it in nearly all its eastern levels, and from thence followed the lode for some distance. Near the crossing a rich chimney of ore occurs in the Caribou; beyond it the Caribou is extremely poor for a long distance, except in its 360-foot level. The No Name, poor before it crosses the Caribou, beyond that lode is very rich, as far as is now known, which is over 90 feet. In the continuation of the 470-foot level of the Caribou, very rich ore in great quantity is found in the No Name vein. Streaks of nearly pure bi-sulphides of silver six inches wide being found inclosed in a very soft and decayed crevice. To the east of the No Name are located crossing veins running parallel with this. These are known as the Columbia Spenser, Terrible and Missouri Valley lodes.

The first northeast and southwest running vein we meet north of the Caribou and west of the No Name is the I. X. L., then the Oriental, mentioned in my previous letter, the Red Jacket, Belcher, Monongahela, Morning Star, Hidden

Treasure, Lalla Couter, Ben Sherwood, and some others. The Belcher and the Monongahela are the most promising of these. The former has proved, by three shafts and many cuts, that at least four good ore chimneys may be expected in working this mine. The Monongahela has a larger crevice than any other of these north-east and south-west veins.

A third group of veins, largely represented on the south-west side of the Caribou Mine, embraces those lodes, which run east north-east and west south-west. These lodes, have, in many respects, the same characters as the east and west veins. They are, apparently, of the same age, and most of them are, probably, only branches of the main east and west veins into which they run, but a crossing has not yet been observed. The most important of these veins, beginning on the north side of the Caribou Hill, are the Peabody, Magnolia, Native Silver, Maine, and Arizona.

The Native Silver is the only mine regularly worked ; it was developed, for a sale, from the day of discovery. No sloping was done, and in most of the levels the pay-streak was left untouched, and the ore, that by sinking and drifting must be taken out, was sorted and kept on hand, neatly piled up. This plan was crowned with success, the property being sold last fall, as rumor goes, at a rather high figure.

There are two shafts, 71 feet apart. The one, 70 feet deep, has a fine crevice containing two feet of good pay ore ; the other is now 220 feet deep. The shafts are connected by levels at 50 feet depth, and the pay ore is left standing. Over the whole length of the west level (175 feet) the ore looks well. East of the shaft the ore occurs in bunches and small pockets, with much barren ground between. At 115 feet below the surface a second level is drifted, showing a little pay everywhere to the west, and but very little ore to the east. At 200 feet deep is a third level, running west 70 feet. Some pay ore is found.

In all the levels there is still standing about 150 tons of ore, averaging probably 30 ounces silver per ton. There have been taken out about ten tons of first class ore running about 200 ounces, and about 100 tons of 60-ounce ore. In all, the vein surface has been proved, by sinking and drifting, over 153 square fathoms. The average assay value, per running fathom, is thus about $100. In the east shaft a rich streak of ore has recently been struck ; this is richer and wider than any heretofore met with in that shaft. It appears that the poorer part of the vein at the present depth is passed and a richer ore zone reached. The distribution of ore in the vein resembles that of the Caribou where the ore chimneys, running nearly perpendicularly, and separated by barren parts of greater or less extent, contain horizontal zones of different richness and mixture of ores. To the depth of about 120 feet the ore in the Caribou vein is found over the whole length of opening rich in sulphurets of silver and the ore chimneys wide. From that depth to nearly 300 feet chimneys contained more galena than in the upper zone, the pockets were less extensive and more barren ground between them. But below this poor zone a richer girdle was found, the sulphurets of silver and copper and native silver increasing in quantity, and the chimneys extending in width.

These zones appear to have the same level in all the veins where observed. The mines lower down the hill than the Caribou found these zones nearer the surface, and it is not improbable that those higher on the hill than the Caribou, the Mount Vernon, Wabash and others, which are said to be wide veins but of low grade, have their outcroppings still in a higher poor zone. v. D.

SELECTED LIST OF PATENTS.

FOR THE WEEK ENDING MARCH 31, 1876.

Relating to Mining, Metallurgy, Gas Making, Engineering, etc. Reported for the "Engineering and Mining Journal" by Louis Bagger & Co., Solicitors of Patents, Washington, D. C.

174,648. Concrete Pavements, Aaron Van Camp, Washington, D.C.—Crushed and pulverized rock, about sixty per cent. of the finer and forty per cent. of the coarser portions. The rock is heated to expel the moisture, and is then saturated with dead-oil, crude petroleum, or the residuum of petroleum, and while in this heated condition, twenty per cent. of natural asphaltum is added, either Cuban, Trinidad, or California, previously dissolved in crude petroleum, or the residuum of petroleum, until it assumes the consistency of pitch.

174,660. Ore Pulverizers and Separators, T. Carter, Niles, Ohio.—Ore is ground in the usual revolving pan, from which it is carried by the elevator to the jigging-sieve, which latter delivers the larger particles of ore to the pan to be reground. The elevator can be raised, by means of a lever, clear of the pan, so that no ore will be removed, if desired. The buckets of the elevator are slotted so as to drop upon the surface of the chute.

174,719. Coal Breakers, D. Clark, Hazleton, Pa.—Behind the adjustable pedestals are placed cast iron tubes, which are strong enough to hold the machine rigidly to its legitimate work. Upon a piece of iron or other hard substance coming between the breakers, the cast iron-tube crushes, and injury to the machine is avoided.

174,768. Valves for Rock-Drills, J. Brandon, New York, N. Y.—For drilling upward or at an angle from the perpendicular, the stroke is regulated by a throttle-valve in the eduction of the opposite side of the piston.

174,830. Self-Sealing Heads for Gas Retorts, P. W. Mackenzie, Blauveltville, N. Y.—The outside of the retort-head is provided with sockets for the insertion of a lever, whereby the head is oscillated and ground down upon its seat. The screw-head is secured to the retort-head in a square socket by a loose joint, to permit the retort-head to rock on the screw.

174,840. Oil-Cans, S. S. Newton, Binghamton, N. Y.—The lower end of the tube prevents the oil from being discharged from the can ; but such oil as may flow down the outside of said tube will be arrested by the drip cup, and will pass through ports into the tube, from whence it may be ejected through the tip of the tube, or may be returned to the can by opening ports.

NOTES.

REFINING COPPER.—The feature of novelty in the invention of Messrs. MANKES and SON, of Paris, consists in freeing copper from its oxide by introducing an alloy of copper and manganese in molten copper. The manganese having more affinity for oxygen than copper, the oxide of copper will be decomposed by the formation of a new oxide, which will separate the oxide from copper.

PHENOMENA CONNECTED WITH THE MOLECULAR CONDITION OF LIQUIDS.—M. MAUMENÉ, in the *Comptes Rendus*, Feb. 14th, 1876, shows that liquids of different characters experience a molecular alteration without any change in their nature. The effect of heat a purely physical influence—gives them a species of *temper*, during which their chemical reactions show abnormal numbers of chemico-calorics.

NOVA SCOTIA COAL FOR THE CENTENNIAL.—In the list of articles for the Centennial Exposition are specimens from no less than twenty out of thirty separate coal mines of Nova Scotia and Cape Breton. In Halifax, where the several qualities of different mines are well understood, there is frequently a difference of from 25 to 33 per cent. in price between Old Sydney, which is considered the best, and other coals produced in the Maritime Provinces.

PANCAKE COAL MINE, WHITE PINE COUNTY, NEV.—Two beds of coal have been passed through in the shaft sunk on this property. The first bed, 15 inches thick, was found at a depth of 190 feet ; the second bed 3½ feet of very superior coal, at a depth of 200 feet. The shaft is 225 feet deep, and it is proposed to continue it to strike lower coal beds. A heavy influx of water has temporarily stopped work. The company proposes to erect extensive coke works at Eureka, to supply coke to the smelting works of the district.

PROPOSED LEGISLATION AGAINST TRADE COMBINATIONS.—Mr. TALMAGE has brought in a bill in the New York Legislature against monopoly, which provides that any company consolidating or coalescing for the purpose of preventing competition shall be adjudged guilty of the violation of the rights and privileges guaranteed by the Constitution to every citizen, and shall forfeit its rights and franchise.

PRICE OF PORT HENRY IRON ORES.—In view of the depression in business, the Port Henry ore producers offer their ores for the ensuing season of canal navigation at $4.50 per ton for selected lumps for puddling, and $3.75 for furnace ore. The prices last year were $4.90 for lump, and $4 for furnace. In 1874 they were $6.50 for lump, $6 for "run of mine," and $5.50 for furnace. These are four months' note prices at wharf at Port Henry. A discount of 5 per cent. is allowed for cash. The Port Henry Ore Company announces that they will not offer any "run of mine" this season.

SENATOR JONES ON NITRO-GLYCERINE TRANSPORTATION.—Senator JONES, of Nevada, has introduced a very absurd bill in the United States Senate, which absolutely prohibits the transportation from one State or Territory to another, or to or from a foreign country, of nitro-glycerine in any other form than that of dynamite, and prohibits the transportation of the latter substance except by merely freight conveyances, and on condition that it is packed in metallic cases, and unaccompanied with any means of exploding it. In the event of a death being caused by explosion when dynamite is transported in any other manner, every person who knowingly permitted or aided its transportation is to be deemed guilty of manslaughter.

PROPOSED CLOSING OF THE CHENANGO CANAL IN THE INTERESTS OF A RAILROAD.—Mr. SHERMAN has introduced a bill in the New York Legislature to relieve the State from maintaining the Chenango canal, and to authorize its use for purposes of a railroad. It authorizes the organization of a railroad company and the use of the canal for a railway, the company to be called the Chenango Canal Railroad Company. The Delaware, Lackawanna and Western Railroad and the Delaware and Hudson Canal Companies are forbidden from becoming interested in the road. The company is authorized to borrow money and issue bonds for the payment of the same. Very stringent provisions are made for the control of the franchises granted.

TREATING CUPREOUS SOLUTIONS.—Messrs. CHADWICK and JARDINE, of Irvine, have patented some improvements in treating cupreous solutions obtained by HENDERSON'S humid process or otherwise, in order to purify the copper and utilize separated substances. The invention consists in adding to the cupreous solution acetate or other suitable salt of lead, in proportion corresponding to the silver salt present. When there is some lead salt in solution, then only what is required to make it up to the proper proportion needs to be added ; and when the cupreous solution also contains salts or compounds of arsenic, antimony or bismuth, then a further quantity of the lead salt, corresponding to them must be added.

NORTHERN CENTRAL RAILROAD COAL PIERS.—The *Railroad Gazette* says, with regard to the recently completed coal pier of this road at Canton, opposite Baltimore. The first shipments were made April 1. This pier, which is built in a most substantial manner, is 1,400 feet in length, 600 feet of which is 100 feet in width, and the remainder 42 feet wide. The portion of it alongside of which vessels can load is 600 feet in length, with a depth at low water of 22 feet. There are eight shutes on each side of the pier , and the intention is to use one side of it for bituminous and the other side for anthracite coals. The storage capacity of the pier is 15,000 tons. The Western Maryland Railroad Company will be assigned a portion of the pier from which to ship coal from the Cumberland region, which is brought over their road. The pier contains 655,000 feet Florida pine, and rests on 3,000 piles of an average length of 50 feet.

THE MELVINA MINE, BOULDER COUNTY, COL.—THE RICHEST ORE IN COLORADO.—This is said to have given the largest proportional profits to its total yield, and the richest average ore of any mine in Colorado, even among the fabulously rich strikes of tellurium land. From the day when work began on this lode, which is located south of the Hoosier Mine, and of the Gold Hill and Boulder road, ore was found of surpassing richness. The first week's work, in July, 1875, netted the owners $8,300. Since then regular sales of ore have been made, that of February bringing over $8,600, of which $8,000 was profit. Professor HILL reports the price paid for the ore, as follows :

738 pounds of ore at $4,100 per ton	$1,512 90
7 tons and 840 pounds at $1.410 per ton	10,462 20
685 pounds at $11,360 per ton	3,983 27
Total	$15,958 37

The total expense attending this magnificent return, including labor, supplies, and freight was only $700! The above was the result of six men's work for 30 days. The shaft is down 110 feet and two levels have been run. One of these levels, (six feet in height), containing the richest pocket—an eight inch vein of ore, returns about $1,000 for each foot driven! The work is almost entirely done by the proprietors on account of the enormous value of much of the ore—some of which it will be seen yields from $1 to $9 per pound as sold, while small quantities could be selected of still higher grade.—*Central City Register.*

PETHERICK COPPER MINE.—From the Houghton *Mining Gazette* we take the following extracts from the annual report of this company for the year 1875 :

The shipments for the season of 1875 were 178,095 pounds mineral, which yielded at the smelting works 143,234 pounds ingot, or 80·44 per cent. The product of the mine for the year was 173,875 pounds mineral, or 86 tons, 1,875 pounds of stamp copper. There were delivered to the stamps during the year 4,840 tons of rock, which yielded 173,875 pounds mineral, or 1·8 per cent.

ASSETS.

Jan. 1, 1876.	
Accounts receivable at mine	$1,002 28
Supply account	5,677 86
Loan account	1,533 16
Unpaid assessment	600 00
Cash	123 95
Copper on hand, 22,190 lb. @ 80·44 per cent., at 20c. per lb	3,569 80
	$12,507 05
Excess of liabilities	3,555 98
	$16,063 03

LIABILITIES.

Jan. 1, 1875.	
Bills payable at mine	$10,544 24
First National Bank, Hancock	3,101 21
Bills payable	2,417 58
	$16,063 03

On this showing the company makes an assessment of 50 cents per share, payable May 1, by holders. April 1. It should be stated that the results of the year are less favorable than had been anticipated, from two causes. First, in the winter of 1875 the water supply was cut short for two months by freezing, and last summer, for a like period, by the drought. Thus, by cold and heat at different times, four months, or one-third of the whole season was lost. What is really needed is an assessment of $2 per share, in order that the adit level may be completed as speedily as possible, by which the mine could be worked 33 per cent. cheaper, and produce copper at as low a figure as any mine on Lake Superior. This, however, is out of the question, in the present dull times for mining, and the company must bide its time. The mining cost per ton has been $5.20, while the yield of copper per ton was $6.25, taking the mineral at 80 per cent., and the price per pound at 20 cents at the mine. Labor in the mill, which includes rock-breaking, amounted to $1.09 per ton.

STATISTICS OF COAL PRODUCTION.

This is the only Report published that gives full and accurate returns of the production of our Anthracite mines.

Comparative Statement for the week ending April 1.

Tons of 2,240 lb.	1876. Week.	1876. Year.*	1875. Week.	1875. Year.*
Wyoming Region.				
D. and H. Canal Co	53,121	374 428	56,165	646,985
D. L. and W. RR. Co.	31,864	257,507	70,645	564,791
Penn. Coal Co	27,109	222,268	24,328	250,578
L. V. RR. Co	19,309	172,414	12,123	238,860
P. and N. Y. RR. Co	318	4,239	1,390	7,367
C. RR. of N. J	29,738	147,273	4,418	53,187
	164,519	1,178,186	169,569	1,761,768
Lehigh Region.				
L. V. RR. Co	58,844	356,045	5,797	105,232
C. RR. of N. J	13,650	162,100	422	5,199
D. H. and W. B. RR.	1,617	9,912	—	6,132
	74,111	528,057	6,225	116,863
Schuylkill Region.				
P. and R. R. RR. Co.	114,191	446,372	17,234	230 287
Shamokin & Lykens Val.	5,593	52,817	25,995	172,171
	119,784	499,789	43,229	402,458
Sullivan Region.				
Sul. and Erie RR. Co.	1,116	14,367	407	3,537
Total	359 510	2,220,399	219,430	2,284,626

* Year beginning January 1st.

The above table does not include the amount of coal consumed and sold at the mines, which is about seven per cent. of the whole production.

The receipts at Port Richmond for the week were 29,000 tons, shipments 14,500 tons, and balance on hand 87,000 tons.

The decrease of shipments of Cumberland Coal over the Cumberland Branch, and Cumberland and Pennsylvania Railroads amounts to 10,000 tons, as compared with the corresponding period in 1875.

Perth Amboy business:

	Tons.
Received for the week	21,609
Shipped for the week	14,295
On hand April 1	29,071

Freights to Boston, $1.05; New Haven, 70c.; Norwich, 80c

Receipts of Coal at Boston, for week ending March 31, and years from September 1st, 1874 and 1875.

From	Week. Tons.	Previously. 1876. Tons.	1875. Tons.
Alexandria and Georgetown	—	55,067	46,200
Philadelphia	10,762	359,512	267,205
Baltimore	4,054	75,863	80,004
Other places	9,997	159,627	106,499
Great Britain	320	2,510	2,124
Nova Scotia	—	12,851	14,942

Belvidere Delaware RR. report.

	Week.	Year 1876.	Year 1875.
Receipts of coal at Coal Port (Trenton)	5,356	10,876	..
" " " South Amboy	9,994	98,433	16,938
Shipments at Coal Port (Trenton)	4,705	5,922	..
" South Amboy	12,874	92,347	82,277

The Production of Bituminous Coal for the week ending April 1, was as follows:

Tons of 2,000 lb., except where otherwise designated.

	Week, Tons.	Year, Tons.
Cumberland Region, Md.		
Tons of 2,240 lb	27,551	267,120
Barclay Region, Pa.		
Barclay RR., tons of 2240 lb	4,924	86,951
Broad Top Region, Pa.		
Huntingdon and Broad Top RR	2,783	37,059
*East Broad Top	1,467	17 833
Clearfield Region, Pa.		
*Snow Shoe	1,427	14,642
*Tyrone and Clearfield	25,857	241,545
Allegheny Region, Pa.		
*Pennsylvania RR	3,758	47,853
Pittsburgh Region, Pa.		
*West Penn. RR	4,839	54,466
*Southwest Penn. RR	929	14,994
*Penn. & Westmoreland gas coal, Pa. RR.	12,021	150,199
*Pennsylvania RR	4,506	80,750

* To March 28.

The Production of Coke for the week ending March 28.

Tons of 2000 lb.	Week. Tons.	Year. Tons.
Tyrone and Clearfield	..	..
Alleghany Region	..	..
West Penn. RR	753	11.211
Southwest Penn. RR	9,493	98,844
Penn. & Westmoreland Region, Penn. RR.	865	7,678
Pittsburgh, Penn. RR	2,769	51,243
Total	13,885	168,976

COAL TRADE REVIEW.

NEW YORK, Friday Evening, April 7, 1876.

Anthracite.

There is more business doing this month than last, yet there is not the amount of it doing that was expected. It is generally supposed that nearly all dealers and consumers of coal who are accustomed to make prompt payments have contracted with the companies for deliveries during the season, leaving but little coal to be sold by middlemen, and that, in most cases, only of special qualities. Under the Combination's system of doing business, of asking buyers to apply for certain quantities with the privilege of taking only what they want, it would not be strange if the business of the year should be much below the amount of applications, in the grand total of which the middlemen figure largely. At the present time the middlemen are doing but very little business, yet they think there will be a chance for them as the season advances, this is quite probable, for there are many buyers who have not made contracts, having but little confidence in the Combination maintaining prices. These, of course, will go to the middlemen where they will be able to get some advantages if companies do not secretly undersell the programme prices. Among the coal producers there are some who will not submit to have their business circumscribed, and, under a binding programme, they find it impossible to do their surplus business otherwise than through middlemen, so that upon the whole it is very probable that there will be some chance for the old established houses, especially those that are discreet.

We are in receipt of the April circulars of a number of the prominent middle firms, and all quote combination prices excepting Mr. A. S. SWOBDS, who makes a reduction of 5c. all around. There is no doubt, however, that the middle interests will treat their trade very liberally.

A Press dispatch, dated Pottsville, April 4, says:—"The Kohinoor, Turkey Run, and West Shenandoah Collieries at Shenandoah City, which it was feared would be idle for an indefinite period of time, on account of the miners refusing to accept the reduced prices, resumed work to-day on the operators' terms, but not full-handed. It is expected the men will go to work to-morrow."

Bituminous.

There has been no further important business reported. Clearfield coal is very quiet, although the output continues large. Cumberland is now freely offered, according to quality, at $3.65@$3.75 per ton f.o.b. at Georgetown, and $3.90@$4 f.o.b. at Baltimore. Notice was given yesterday, by several of the Cumberland companies, of a reduction, to take place on Monday, the 10th instant, of 10c. per ton for cutting coal, 12c. per ton for heading work, and a corresponding reduction on general labor. This reduction is not considered sufficient, and will, probably, be followed, before long, by another. The Consolidation Company has shown no inclination to join this movement, probably desiring to regain, with the workmen of that region, a portion of their lost popularity, and that they may be held up in this city as a model of generosity, and the true friend of the working man. This company has not yet indicated what action it will take upon the legislative enactment to reduce freights over its road one cent per ton per mile, but as the Legislature has adjourned for two years it is thought that some opposition will be shown. It may be well to state that the Summary Procedure Bill, which was signed by the Governor on the 4th inst., is likely to prove an important adjunct in enforcing a compliance with the bill to reduce freights. The price of the stock of the company has had an upward inclination during the week and in the face of reports showing quite a reduction in the business done so far this year as compared with the corresponding period of last year; the question is treated at length in our financial report. Public opinion is so strongly fixed against this company, that any attempt at evasion of the law and the will of the people, will surely end in defeat.

The License Bill, intended to levy a tax on all coal mined in the State of Maryland, was defeated.

Gas Coals.—These are very quiet, no further important sales being reported.

Freights show much more firmness for shipments from New York shipping ports, although from Baltimore and Georgetown there is no change. Rates are so very low that an advance may be anticipated.

Coal Trade of Philadelphia.

PHILADELPHIA, April 6, 1876.

Calm has succeeded to the hurry and confusion which existed last week, when contracts were pouring in at a fearful rate. Orders to ship on the contracts are coming very slow, and every one is going over his list of them and trying to make up what the orders will amount to. No coal is ordered at circular rates. It is believed that considerable more coal has been secured at contractors' and consumers' rates than is required for the whole year, and that, consequently, those who have not contracted will have no trouble in getting what they want from those who have.

The line and city trade are moving fairly, but not as actively as was expected after such a long stoppage.

Considerable excitement was created amongst parties belonging to the Coal Exchange by bids being made by several members to supply the water works of this city at lower rates than the minimum agreed upon. This is a bad beginning, when good faith is absolutely necessary to carry out the programme.

Freights are $1.35 to Boston, $1.25 to Providence, and as low as 75 cents to Washington.

Receipts seem to be larger than shipments, and coal accumulating already.

Wholesale Prices of Anthracite Coal for April, f.o.b. at the Tide Water Shipping Ports per ton of 2240 lb.

	Lump.	Steamer.	Grate.	Egg.	Stove.	Chestnut.
Wyoming Coals.						
‡Lackawanna and Scranton at Hoboken and Weehawken	4 60	4 70	4 80	4 90	5 50	4 70
Pittston at Newburg	4 45	4 55	4 65	4 75	5 35	4 55
Wilkesbarre at Port Johnston	4 60	4 70	4 80	4 90	5 50	4 70
Plymouth, R. A.	....	....	4 80	5 00	5 60	4 80
Susque. Coal Co. at Amboy W.A.	4 60	4 70	4 80	5 00	5 50	4 80
Kingston at Hoboken	4 60	4 70	4 80	4 90	5 50	4 70
Lehigh Coals.						
Old Company at Port Johnston	5 10	....	4 90	4 90	5 50	4 80
Old Company's Room Run "	5 10	....	4 90	4 90	5 50	4 80
§Sugar Loaf, Hobok. & Amb."	5 10	....	4 90	4 90	5 50	4 80
Lehigh Coal Exchange "	5 10	....	4 90	4 90	5 50	4 80
Honey Brook Lehigh	5 10	....	4 90	4 90	5 50	4 80
Beaver Meadow at South Amboy	5 10	....	4 90	4 90	5 50	4 80
Schuylkill Coals at North 9th st., Brooklyn, E. D.†						
Schuylkill white ash	4 60	4 70	4 80	4 90	5 50	4 70
Schuylkill red ash	....	....	....	5 00	5 60	4 70
Shamokin white and red ash	....	....	....	5 00	5 60	4 70
Lorberry	....	....	5 70	5 70	5 70	4 75
Lykens Valley	....	....	6 10	6 10	6 10	5 20

* Contractor's prices are 20c. per ton less.

† The prices of Schuylkill coals for shipment from Philadelphia are 35c. per ton less than at Brooklyn.

‡ Boats towed by the D. & H. C. Co. at its expense to and from New York harbor.

	Per ton.
Freight from Hoboken and Weehawken to New York	35@40c.
" " Elizabethport & Port Johnston to N. York.	40c.
" " South Amboy to New York	40c.

Freight by the boats of the companies from Hoboken, Port Johnston, Weehawken, Rondout, South Amboy and Perth Amboy to New York City and vicinity 50c

Freight by the Pennsylvania Coal Company's boats from Newburg to New York 65c.

Prices of Anthracite Coal, f.o.b. at New York Shipping Ports, to actual consumers with whom season contracts may be made.

	Lump.	Steam.	Broken.	Chestnut.
March	4 20	4 30	4 40	4 30
April	4 20	4 30	4 40	4 30
May	4 25	4 35	4 45	4 35
June	4 30	4 40	4 50	4 40
July	4 35	4 45	4 55	4 45
August	4 40	4 50	4 60	4 50
September	4 45	4 55	4 65	4 55
October	4 50	4 60	4 70	4 60
November	4 55	4 65	4 75	4 65
December	4 60	4 70	4 80	4 70

Prices at Port Richmond, Philadelphia, will be 35c. per ton, less than the above.

Wholesale Prices of Bituminous Coal.

Domestic Gas Coals.

Per ton of 2240 lb.	At the Shipping Ports.	Alongside in New York.
Westmoreland and Penn. at Greenwich, Philadelphia	$4 70	$6 00
" " at S. Amboy	5 50	6 00
Red Bank Cannel Pa. at Philadelphia	8 00	8 50
" " South Amboy	8 50	....
" Orrel	6 00	6 50
Youghiogheny, Waverly Co., at Balt.	4 25	5 75
Despard, West Va.,	4 50	6 00
Murphy Run, West Va., at Baltimore	4 50	6 00
Fairmount, West Va., " "	4 50	6 00
Newburgh Orrel, Md. " "	4 50	6 00
Cannelton Cannel, W. Va.,	....	10 50
" Splint, " at Richmond.	4 50	6 00
Peytona Cannel, " "	8 75	10 50
Straitsville " at Sandusky, O.	nominal.	

Manufacturing and Steam Coals.

Cumberland, at Georgetown and Alexandria, Va. ..... 3 63@3 75 — 5 00

Cumberland, at Baltimore ..... 3 90@4 00 — 5 25

Kittanning f.o.b. Canton, Baltimore..4 25@4 35

Broad Top, at the mine, per 2,000 lb., 1 10. f. o. b. Greenwich, Philadelphia, per 2240 lb, 3 90, 4 00. 4 25 and 4 50, according to destination; at Amboy, 5 00; New York, 5 45.

Clearfield and Allegheny, "Kittanning," "Sterling," "Sonman," and "Eureka," at the mines, per 2000 lb., 90; at Greenwich, Phil., per 2240 lb., 3 90, 4 00. 4 25, and 4 50, according to destination; f. o. b. South Amboy, N. J., 5 00; New York, 5 45.

Foreign Gas Coals.

	Sterling.	Am. cur'cy,
Newcastle, at Newcastle-on-Tyne	9/6@11/	6 50@ 7 00
Liverpool House Orrel, at Liverpool	26/	13 00
Ince Hall Cannel "	42/	18 00@20 00
" Gas Cannel "	28/	13@14
Scotch Gas Cannel, at Glasgow, nominal,	25/	7 50
	Gold.	
Block House, at Cow Bay, N. S.	2 00	5 00
Caledonia, at Port Caledonia	1 50	4 75
Glace Bay, at Glace Bay	1 50	4 75
Lingan, at Lingan Bay	1 75	....
Sydney, International and Reserve mines, at Sydney	2 00	5 50
Pictou, Albion & Vale mines, at Pictou.	2 25	5 75

Retail Prices in New York.

Anthracite.

Per 2000 lb.	Grate and Egg.	Stove.	Chestnut.
Pittston coal, in yard	$5 70	$6 00	$5 30
Lackawanna coal, delivered	6 25	6 75	5 75
Wilkes-Barre, "	6 25	6 75	5 75
Lehigh & Locust Mountain, del'd	6 00	7 00	6 00
Schuylkill Red Ash, del'd	7 50	7 50	6 00

Our retail quotations of Pittston Coal are based on the actual selling rates of the company, nominal quotations of grate and stove are 20c., and of nut 30c. per ton above these rates. The Cost of delivery ranges from 40 cts. to $1 10 per ton, according to distance from the yard.

Bituminous.

Liverpool House Orrel, delivered, per ton of 2000 lb....$23 00
Liverpool House Cannel " " " ....†22 00
American " " " " 13 00
Kanawha splint, " " " 15 00
American Orrel " " " ....11@14
Red Bank Cannel " " " 14 00
Cumberland " " " 7 00

† This quotation is furnished to us by Messrs. WARD, TALBOT & OLYPHANT.

Boston. April 1, 1876.

The inquiry for coal from yardmen has been somewhat increased, but the desire for deliveries has been for a month or two hence, rather than on prompt shipments. The announcement is made that, chestnut coals have been advanced 10c. at the shipping point, and that the offers to manufacturers to contract irrespective of a given quantity are to be held open until the 15th of April.

The movement to reduce shovellers' wages has again been made, and a strike which lasted one day ended, with a concession of 8c. The rates of freight are not encouraging to these delays in unloading; hence for a skipper arrived to haggle over 5c. a ton on a shoveller's price, when 8c. a ton demurrage is being added up each day, isn't on the whole very profitable.

This is one of the points which give some of the Sound ports a preference for characters. Our Boston coal trade ought to unite and settle this evil. Twenty-five cents is now the more general price paid, although discharges have been made this week which have cost 35c. After a New York captain pays his discharge and trimming expenses it leaves from 60c. to 70c. a ton, for a 300-tonnage trip say, $180, giving a small if any dividend to schooner owners.

BITUMINOUS is doing a little more. Consolidations quoting $3.65 at Georgetown and $3.90 Baltimore, the others are not gossiped upon the street at less than $3.75 and $4. A number of mill and railway contracts are in the market, but, pending the adjustment of mining wages, canal tolls, an I railway charges, nothing special has been closed.

FOREIGN.—We note the arrival of 320 tons Lingan ex *George Hughes*, which had been ordered and loaded last fall. The cargo was divided up, and quotations are not named.

FREIGHTS are very quiet. A few charters from New York at $1 and at 90c. have been made; $1.25 from Philadelphia, and $1.50 from Baltimore.—*Commercial Bulletin.*

Buffalo, N. Y. April 3, 1876.

Reported by our Special Correspondent.

ANTHRACITE.

	Afloat. f.o.b.	Retail, Deliv'd.
Grate	$6 40	$7 40
Egg	6 40	7 40
Stove	6 85	7 85
Nut	6 60	7 60

	Lump.	Run of Mine.	Nut.	Slack.	Nut & Slack.
Connellsville Coke	$5 15	....	....	....	....
Brookfield Coal	4 25	....	....	....	....
Briar Hill	4 25	....	2 80	....	....
Youghiogheny	4 50	....	....	....	....
Monterey	3 30	3 25	....	2 30	....
Catfish	3 30	3 25	....	2 30	....
Stoneboro	....	Bk'n	....	2 30	....
Cannel	5 50	4 75	4 50	....	....
Cameron	3 50	3 00	....	2 30	....
Reynoldsville	3 65	3 50	3 00	2 30	....

Chicago, Ill. April 4, 1876.

Specially reported by Messrs. RENO & LITTLE, Coal Merchants. Retail prices per ton of 2000 lb. delivered to buyer.

For the past two weeks there has been some improvement in the demand for coal. The weather has been cold and stormy—more snow fell in March than fell during all the winter months. The stocks of coal, both anthracite and bituminous, are abundant. No change in prices.

		BITUMINOUS.	
Lehigh Lump	$10 50	Briar Hill and Erie	@ 7 00
Lehigh grate and egg	10 50	Walnut Hill, Pa.	@ 6 50
Lehigh stove and chest.	11 00	Midway, Pa.	@ 6 50
Lackawanna, Wilkes Barre and Pittston*		Cannel	@ 8 00
		Blossburg	7 50
Grate and egg	9 50	Indiana Block	6 00
Stove and chestnut	10 00	Hocking "Brooks"	6 50
		Wilmington and Illinois	5 00

* 50 cents off these prices for car load lots to country dealers and manufacturers.

Cincinnati, O. April 3, 1876.

Reported by our Special Correspondents.

There have been still further reduction in price of coal at retail, viz:

	Per ton of 2000 lb.	Bush.	Ton.
Youghiogheny, or Pittsburgh, afloat		7½c.	——
Pomeroy coal	"	5½c.	——
Kanawha "	"	7½c.	——
Cannel coal, according to quality	"	11@16 c.	——
The following are the retail prices delivered			
Pittsburgh coal, per load of 25 bus			$2 75
	and round lots at		2 50
Youghiogheny		—c.	3 00
Pomeroy		11c.	2 25
Cannel		—c.	5 50
Kanawha Semi-Cannel		—c.	2 75
Anthracite, per ton			10 00@11 00
Coke, at yard		7c.	——
Coke, hard and soft, delivered		9c.	——

Erie, Pa. April 3, 1876.

Wholesale, per ton of 2000 lb. Bituminous f. o. b.

Briar Hill lump	$3 75	Beaver lump	$3 50
Midway	3 25	Cat Fish	3 00

Louisville, Ky. April 3, 1876.

Specially reported by Messrs. BYRNE & SPEED.

Our market is now, as during most of the Winter, very quiet.

Please report our prices as follows:

WHOLESALE.

	per bushel		per bushel
Pittsburgh	12c.	Pine Hill	—
Raymond City	9c.	Kentucky	8c.

RETAIL.

	per bushel		per bushel
Pittsburgh	12c.	Peytona Cannel	20@22c.
Raymond City	11c.	Buckeye "	2c.
Pine Hill	13c.	City-made Coke	10c.
Kentucky	10c.	Anth., per ton, $10 00 to 10 50	
Screened Pittsburgh per load			$3 00
Screened Raymond City			2 75
Pine Hill (Kentucky)			2 75
Cannel			$5 to 5 50

New Orleans, La. April 3, 1876.

Reported by C. A. MILTENBERGER & Co.

Pittsburgh coal, retail, per bbl	55c.
" wholesale	28c.
" steamboats, per box	50c.
" to manufacturers, per bbl	45c.
" shipments, per hhd	$6 00
Anthracite, wholesale, per ton	....
" retail, "	....
Virginia Cannel, per bbl	80c.
Scotch " "	80c.
Mt. Carbon, wholesale, per bbl	...
" " retail, "	....
St. Bernard wholesale, per bbl	50c.
" retail, "	....

Richmond, Va. April 3, 1876.

Specially reported by S. H. HAWES, Dealer in Coal.

Per ton of 2240 lb., f.o.b.

Kanawha Cannel	$9 00	New River Bituminous,	$4 50
" semi-Cannel	4 75	Clover Hill Coal	4 00
Coalburgh Splint	4 75	James River Bitum	3 30
Lewiston "	4 75	" " Carbonite,	5 80
Kanawha Gas coal	4 50		

San Francisco, Cal.

From the *Commercial Herald*, March 23, 1876.

Imports from Jan. 1st to March 1st:

	tons.		tons.
Anthracite	4,139	English	5,502
Australian	11,823	Vancouver Island	10,657
Coos Bay	7,520	Rocky Mountain	64
Cumberland	2,044	Seattle	12,854
Mt. Diablo	17,700	Bellingham Bay	3,175

The Pacific *Tribune*, published at Seattle, W. T., March 4th, says: "The exports of Coal from Seattle in February were greater than for any previous month in any previous year. The aggregate was 11,509 tons, all of which was sent to San Francisco. The Seattle Company made seven shipments, of 7,775 tons; the Renton Company two, of 1,875 tons; and the Talbot Company three, of 1,859 tons; a larger quantity for each company than ever before. During January the shipments were five in number and 5,440 tons in quantity. For the two months the aggregate is seventeen vessels and 16,949 tons, an average which, if maintained through the year, will make 100 ship-loads of 1,000 tons each. Seattle now stands at the head of the sources of supply for San Francisco, the next nearest to it being Mt. Diablo, in California, which has hitherto been far in the advance. Two years ago at this time hardly a ton of coal was being sent into San Francisco from this place, and this immense business has entirely grown up since." The Pacific Mail Company are large buyers and consumers of this bituminous coal. The mines of Vancouver Island are also being worked freely and their product greatly increased. The Wellington is a growing household favorite, and by some preferred to all other kinds. Nanaimo is largely used by the Gas Company. The arrivals during the week embrace: *El Dorado*, 1,825 tons from Seattle; *Amethyst*, 500 tons Bellingham Bay; *Marmion*, 1,200 tons from Seattle; *Harvest Home*, 965 tons do. In absence of reported sales, we quote Australian, $10@10 25 ex ship. Supplies of Cumberland are well controlled, and in casks held at $22; bulk, $18. Lehigh is plentiful and prices nominal. We quote Bellingham Bay at $8.50; Coos Bay, $10; California Mount Diablo Steam, $6.25@$8.25 for fine and coarse respectively; English and Scotch Steam, $9@9.50; Nanaimo, $9.50@$10; Seattle, $9.50@$10; Anthracite, $12@$15; Lehigh, $14@$15; Wellington, $11@$12.

Toledo, Ohio. April 3, 1876.

Specially reported by Messrs. GOSLINE & BARBOUR.

We quote coal as follows:

Per ton of 2000 lb. on cars.

Hocking Valley	$3 40	Massilion	3 60
Straitsville	3 40	Youghiogheny	5 00
Shawnee	3 40	Blossburg	6 50@7 00
" nut	2 90	Cumberland	6 50@7 00
Briar Hill	5 50	Connellsville coke	0 40

ANTHRACITE.

Grate, screened	$7 20	Stove, screened	$7 70
Egg, "	7 20	Chestnut "	7 45
Lehigh Lump	9 50		

40 cents to $1 per ton additional for delivery at retail.

Halifax, N. S. March 31, 1876.

Prices per ton of 2240 lb. in gold.

Sydney (old mines)	$4 00	Little Glace Bay	3 35
Gowrie	3 35	Blockhouse	3 35
Victoria	——	Albion (at Railroad)	4 00

Montreal. March 31, 1876.

Specially reported by Messrs. ROBERT C. ADAMS & Co.

Wholesale per ton of 2240 lb.

Scotch Steam	$6 00	Cape Breton Steam	$5 25
Pictou "	5 75	Newcastle Smiths	7 50

Anthracite at retail, per 2000 lb., delivered.

Egg	$8 50	Chestnut	8 50
Stove	9 50		

Toronto, Ont. March 31, 1876.

Chestnut $7 25
Stove 7 50
Egg and grate 7 25
Bituminous coal for domestic use 6 00
" " steam ..... 3 50@5 50
Lehigh Lump and broken 7 50
Blossburgh 6 30

Rates of Transportation on Anthracite Coal to Tide Ports.

Lehigh and Wyoming Coals. per ton of 2240 lb.	From Penn Haven.	From Mauch Chunk.	From Hazleton**		From Upper Lehigh.	From Ashley and Sugar Notch.
To ‡ Newark, N. J. (117 miles), via Central Railroad of New Jersey	2 30	2 16	2 74	2 63	2 86	
‡ Mauch Chunk, Pa., via Central Railroad of N. J.	14	..	56	47	70	
‡ Philipsburg, N. J., (46 miles)	86	72	1 21	1 19	1 42	
Elizabethp't, (114 m.) Ft. Johns., Hoboken & South Amboy, N. J., shipping and wharfage 35c. add.	1 94	1 80	2 29	2 27	2 50	
High Bridge, N. J.	2 40	1 95	2 80	2 54	2 72	
Elizabeth, Cranford, Westfield & Elizabethport, for consumption,	2 30	2 16	2 63	2 63	2 86	
Jersey City, N. J., (121 miles) and New York, via L. V. RR.	2 30	2 16	2 63	2 63	2 86	
Andover, via Delaware, Lackawanna and Western RR.	3 30	3 10	3 70	3 69	3 99	
Trenton Somerset Junction and Greensburg, via P. RR. Belvidere Division	2 65	2 45	3 05	3 04	3 34	
Trenton, (97 m.) for shipment, including shipping and wharfage	2 11	1 95	2 45	2 46	2 76	

From *Mauch Chunk* to *New York* (121 miles), (towing limits) and Jersey City† via Delaware Valley RR. $2 37

From *Mauch Chunk* to *Philadelphia* (93 m.) via L. V. and L. and S. RR. and North Penn. RR 1 75

††From *Phillipsburg, N. J.* to *Hoboken* (84 m.) for shipment via Delaware Lackawanna and Western RR., Morris and Essex Division 1 08

From *Lackawanna Junction* to **Auburn, N. Y.*, (191 m.) for shipment, via Southern Central R R. in connection with Pa. and N. Y. R.R. 2 53

From *Lackawanna Junction* to *Weedsport* (201 m.), for *Rochester and Charlotte* 2 59

From *Lackawanna Junction* to *Sterling* for *Oswego, N. Y.*.. 2 62

‖ To this point for all places between Rochester and Buffalo the rate is 2 53

* The rate to this point for Syracuse is 2 08

** Rates on line coal from Hazleton are 10c. per ton above these figures.

‡ The cost of unloading is to be added to these rates. No charge less than 40c. per ton will be made for any distance. Tolls from Mauch Chunk to Phillipsburg for way points will be $1 15 per ton.

§ Twenty cents per ton less when five cars at a time to one party. Provided that where the reduction makes the rate $1 a ton, or less, the rate will be $1.

† Transportation on Coal destined for re-shipment from this point is 20c. less than above rate.

†† The rate for consumption to this point is $1 80.

The distances in the above table are Computed from *Mauch Chunk*. From *Ashley* to *Mauch Chunk* the distance is 51 miles, and from *upper Lehigh*, 33 miles. From *Hazleton* 24 miles, and from *Penn Haven* 8 miles.

From *Wilkes-Barre* to *Perth Amboy* via the Lehigh Valley Railroad Company, the distance is 101 miles, and from *Mauch Chunk* it amounts to 106 miles.

Freights on Bituminous Coals from the Mines to Tide Water Shipping Ports.

From the Mines to Cumberland and State Line (say an average of 20 miles), the legal charge is 2 cents per ton of 2240 lb. per mile.

From State Line to Amboy (346 miles) $4 per ton of 2000 lb. On coal shipped beyond this point there is a drawback of 75 cents per net ton.

From Cumberland to Baltimore (178 miles) $2.02 per ton of 2240 lb., or $1.80 per net ton (¼ cent per ton per mile for use of hoppers over C. & P. RR.).

From Cumberland to Georgetown (152 miles) by canal, $1.10. Tolls, 46 cents.

From the Mines to Piedmont, 4 cents per ton of 2240 lb. per mile on distances less than 4 miles, and 3 cents per ton per mile on distances over 4 miles, and 2 cents per ton per mile on distances over 10 miles.

From Piedmont to Baltimore (206 miles) $2.41 per ton of 2240 lb., or $2 15 per net ton.

From Osceola to Greenwich, Phila. (say 248 miles) per T. & C. RR, per ton bituminous coal of 2000 lb., less drawback of $1.46 $2.15; rate per gross ton, $2.60.

From Osceola to South Amboy, N.J., (317 miles) per 2000 lb., $4.03, less drawback, $1.03; rate per net ton, $3; add 12 per cent for gross ton, 36 cents, terminal expenses, shipping, 20 cents; rate per gross ton, $3.56.

Freights on Bituminous Coal and Coke over the Chesapeake and Ohio Railroad.

To	From New River District, say, at Quinnemont.			
	Bituminous Coal and Coke.			Coal Screenings
	Distances.*	Regular Rate.	Special Rate.	Rate.
	Miles.			
Charleston	75	1 00	70	50
Huntington	127	1 20	80	60
Staunton	158	2 30	2 00	1 50
Charlottesville	197	2 80	2 50	2 00
Gordonsville	218	3 00	2 70	2 40
Hanover Junction	276	3 25	3 10	2 50
Richmond	294	3 25	3 10	2 50
Richmond *via* Hanover Junction		3 50	3 35	2 75
James River	297	3 25	3 00	2 50

To	From Kanawha District, say, at Blacksburg				
	Bit. Coal and Coke.		Cannel Coal.		Coal Screenings.
	Regular Rate.	Special Rate.	Regular Rate.	Special Rate.	Rate.
Charleston	80	50	1 20	80	40
Huntington	1 00	60	1 50	1 00	50
Staunton	3 00	2 50	4 00	3 50	2 00
Charlottesville	3 30	2 80	4 25	3 70	2 30
Gordonsville	3 35	2 90	4 40	3 90	2 40
Hanover Junc	3 40	3 10	4 50	4 10	2 50
Richmond	3 40	3 10	4 50	4 10	2 50
Richmond, *via* Hanover Junc.	3 65	3 35	4 75	4 25	2 75
James River	3 40	3 00	4 50	4 00	2 40

A Terminal charge of ten cents per ton, in addition to rates above, will be collected on all coal and coke at James River. Also, at Huntington, a charge of five cents per ton for transferring by tipple, or ten cents per ton for transfer from car to barge on the river track.

This Tariff supersedes all *Special Rates* on coal and coke to any station, except existing special rates to iron furnaces.

Local Tariff No. 7 will govern rates to all stations, excepting as modified by this special tariff but the rate to any station, between the stations above designated, shall in no case exceed the rates named herein to the first point beyond it, of the stations above named.

Special Rates—The rates given above in columns headed "Special Rates," will apply on all shipments of coal or coke mined or made on the line of this road, destined for use in steam or manufacturing purposes; also on all shipments destined for any point off the line of the Chesapeake and Ohio Railroad.

Agents, when they cannot be certain that shipments are destined for use in steam or manufacturing purposes, will collect freight at regular rates as above, and overcharges, if any occur, will be promptly refunded through the General Freight Office.

A charge of twenty-five cents per ton, in addition to all rates herein given, will be made for delivery of coal or coke at points *between stations* requiring the use of an engine.

Coal Screenings—By "Coal Screenings" is meant dust, nut and fine coal that will pass through a screen of one and a half inch meshes, and will only be taken at the Company's convenience.

* These distances are computed from Quinnemont (or the New River District) Blacksburg (or the Kanawha District) lies 56 miles west of Quinnemont, which distance will be added to all coal going east of the New River District and deducted from Huntington and Charleston, which lie west of the same.

Freights.

Per ton of 2240 lb.

PORTS.	From Philadelphia.	From Baltimore.	From Georgetown.	From Elizabethport, Port Johnson, South Amboy, Hoboken and Weehawken.
Augusta, Me	....	....	....	....
Albany	†80	...	...	....
Amesbury, Mass	....	....	....	....
Bangor, Me	....	....	....	1 00
Bath, Me	....	1 50	...	1 00
Baltimore	....	....	....	....
Boston, Mass	1 25@1 35	1 45	150–55	1 00
Bridgeport, Ct	*70	1 40	....	70
Bristol, R. I.	....	....	....	85
Cambridgeport, Mass.	§1 25@1 40	....	...	1 00
Derby	....	....	....	....
Dighton	....	....	....	....
East Cambridge	§1 25@1 40	....	....	§1 00
Fall River	1 25	1 40	....	85
Hackensack	*70	....	....	....
Hallowell, Me	....	....	....	....
Hartford	*70	....	....	....
Hoboken	†70	1 20	1 25	40
Hudson	....	1 20	....	....
Jersey City	70	1 20	1 25	40
Lynn, Mass	....	.. ..	....	†1 00
Middletown	....	....	....	1 00
Mystic	....	....	....	....
Newark	....	1 50	....	....
New Bedford	1 30	1 50	....	85
Newburyport	....	1 65	....	1 10
New Haven	*70	1 40	1 30	70
New London	1 25	1 40	....	80
Newport	1 25	....	....	85
New York	70††	1 25	1 25	40
Norwalk	70‡	1 40	....	70
Norwich	1 25‡	....	....	90
Pawtucket	1 75‡	....	....	....
Philadelphia	....	....	....	....
Portland	1 30	1 40	....	1 00
Portsmouth, N. H.	1 30@1 40	1 65	....	1 10
Providence	1 25	1 40	....	85
Poughkeepsie, N. Y.	....	....	....	....
Rockport	....	....	....	....
Saco	....	....	....	....
Sag Harbor	....	....	....	1 00
Salem, Mass	1 25@1 35	1 45	....	1 00
Salisbury Pt., Mass	....	....	....	...
Stamford	*70	....	....	70
Stonington	....	....	....	....
Taunton	.. .	..	....	....
Troy	†80	....	....	....
Warren, R. I.	....	....	....	85
Wareham	....	....	....	....
Weymouth	....	....	....	....

* And discharging and towing. † And discharging. ‡ And towing. § 3c. per bridge extra.

Towing.

Rates of Towing from New York to places on the *Hudson River*. Boats of 175 tons capacity and upwards.

Per ton of 2240 lb.

	cts.		cts.
Manhattanville	8	Haverstraw	16
Spuyten Duyvel	8	Verplanck's Point	16
Yonkers	9	Peekskill	16
Hastings	11	West Point	17
Piermont	12	Cold Spring	17
Dobbs' Ferry	12	Newburg	18
Nyack	15	Poughkeepsie	20
Tarrytown	15	Rondout	23
Sing Sing	15	Hudson	25
Croton Landing	16		

Rates for boats of 100 tons, per boat, are as follows:

	cts.		cts.
Manhattanville	10	Sing Sing	20
Spuyten Duyvel	11	Peekskill	20
Yonkers	15	Newburg	25
Tarrytown	18	Poughkeepsie	30

Special Rates will be made for Saugerties and Catskill.

East River, from the foot of Twenty-third street, to the following points, *and return*, per ton:

	cts.		cts.
New Haven	33	Milford	35
Branford	45	Bridgeport	33
Southport	35	Westport	35
Norwalk	33	Middletown	65
Hartford	75	New London	60
Norwich	67	Stonington	75
Mystic	75		

Derby 33 cts. per ton and $50 per boat extra.

Bristol, Fall River, Providence, New Bedford, *Special rates.*

Boats having less than 200 tons, will be charged the same as if carrying that quantity.

Rates via the Hudson River are furnished to us by A. B. VALENTINE, No. 41 Jay Street. Rates via the East River are furnished by W. E. GLADWISH, No. 12 South Street.

IRON MARKET REVIEW.

New York.

FRIDAY EVENING, April 7, 1876.

American Pig.—We notice sales aggregating 800 tons of the Thomas Iron Co.'s Nos. 1 and 2 foundry iron at $22 and $20, respectively, also a sale of 100 tons of another brand of No. 1 foundry at less than $22. Prices are weak, and unless a combination be entered into they are likely to continue the downward inclination. There is an effort being made to form a combination to advance and maintain prices, but the movement is hardly likely to prove a success, as no one company has much faith in the good intentions of another, and to make a success of the movement it will be necessary to fix some substantial penalty to the offense of breaking faith. This penalty would have to be secured by a deposit to be forfeited in case the terms of the combination are not strictly complied with. This would be seriously objected to by such compacies as have already been "putting up" their iron, and who still find it difficult to raise the necessary funds to meet the current demands upon them. It looks as though some of the companies have arrived at the conclusion that they must abandon the policy of undercutting in prices for the purpose of securing trade, since the experiment has not proved a success. We quote No. 1 foundry at $22; No. 2 foundry, $20; and forge at $19.

Scotch Pig.—We note sales of 200 tons of Eglinton, from ship, on private terms. With sufficient business, in a small way, to take up the light arrivals, prices continue very steady. We quote Eglinton at $29; Glengarnock, $30@$31; Coltness, $32; and Gartsherrie, $31.50.

MESSRS. JOHN E. SWAN & BROS., of Glasgow, under date of March 24, report as follows: Number of furnaces in blast 119, as against 123 a year previous; stock in CONNAL & Co.'s stores 62,604 tons, a decrease of 246 tons from a week previous; shipments for the week ending March 18, 7,646 tons, a decrease of 2,966 tons, as compared with the corresponding week of 1875; quotations as follows for No. 1 iron: Gartsherrie, 68/; Coltness, 70/; Summerlee, 66/ 6 d.; Langloan, 69/; Glengarnock 65/ 6 d.; Eglinton, 58/. They quote freights as follows: To New York, 2/ 6 d.; Boston, 9/; New Orleans, 5/; Baltimore, 8/; Philadelphia, 10/; and San Francisco, 27/ 6 d."

Rails.—There is nothing doing in these. Prices remain unchanged, at $40@$43, iron rails at mills, and $60@$63 for steel.

Old Rails.—These are very quiet, and may be nominally quoted at $23.

Scrap.—To avoid duplication of reports it may be well to say that there were about 3,200 tons sold during the past month. We quote at $31@$32, nominal.

Baltimore.

April 5, 1876.

Specially reported by Messrs. R. C. HOFFMAN & Co.

The iron market continues dull and depressed, without change in quotations.

Baltimore Charcoal	$32@35	Anthracite No. 3	$20@21
Virginia Charcoal	28@34	Mottled and White	17@19
Anthracite No. 1	23@24	Charcoal C Blooms	65@67 50
" No. 2	22@23	Refined Blooms	55@60 00

Boston.

April 1, 1876.

Reported by our Special Correspondent.

We can only report a moderate demand for pig iron, with a slight falling off in prices, the best brands still command fair prices. Scotch is not inquired for and the stock here is small. Charcoal irons are without change. Bars are sold from store at less than 50 dollars per ton by some dealers. Scrap is in small supply and sells at less than 30 dollars per ton.

PIG has had a small business, if about twenty orders for five and ten-ton lots can be so magnified. The nearby founderies are all doing a little more, but the anxiety of cast scrap for a market confines the consumption of pig to the most economical turns. Lots of fancy No. 1 have this week been put on cars at $25.50 and $26. the buyer being of some account in this half-dollar discrimination, No. 2. selling at $24 f. o. b. In gray forge the market seems to credit a rumor that 2400 tons f. o. b. up the Hudson at $18 had been contracted to a Massachusetts furnace, the deliveries to be made any time through the four months.

BAR, while improving in business, does not improve in values. There is no decided reason why anything less than $49 should be quoted, and yet there are evidences that this is not quite the bottom. That sales can be made at 50c. less can hardly be disputed, and, though it is a strong temptation to quote $48.50 and suggest $48 possible, an inquiry from some interior dealers for the names of such sellers might be embarrassing to reply with exact buyers and sellers.

The press reports of the Pittsburgh combination for 2 3-10c. at the mills, while no Boston jobber thinks of asking out of store more than 2 2-10c. are a surprise. It can't be possible that our trade would stock up at a net cost in store of 2 4-5c. and be so weak at 2 1-5c. in selling that a loss of more than 3-5c. would be encouraged. There is no question but that $1.90 at the West would secure a contract, but our dealers are hardly certain where to go from 1¾c. This is a fraction more than ⅛c. below the quoted combination price—isn't that an unusual difference per pound between buyer and seller? Surely the press reports of the bar-iron markets elsewhere have not yet reached the true inwardness of the situation. A little more inquiry is making for boiler plates on the basis of 3c. for No. 1, and 5¼@5¾ for rivets.

STEEL is joobing in a moderate way. The Douglas Axe Company and the Ames Shovel Company are understood to have booked unusually large orders from a London house for the Australian market, a pleasant centennial item of the progress of American industries.

We quote American tool 14@15c: American Machinery 8½@9½c; Bessemer tires 5¾c.; Sweet's excelsior tire, 7½c.; English tool, 15½c., gold.—*Commercial Bulletin.*

Chattanooga, Tenn.

April 4, 1876.

Specially reported by J. F. JAMES. pig iron broker, etc., 233 Market Street.

The pig iron market here remains unchanged in prices and demand.

Cleveland, Ohio.

April 3, 1876.

Messrs. C. E. BINGHAM & Co., quote as follows:

Per gross ton, on four months' time. Subject to change in market. Discount for cash 4 per cent.

FOUNDRY IRON.	
No. 1, Lake Superior Charcoal	28 00@....
No. 2, " " "	27 50@....
No. 1. Anthracite	26 00@....
No 2, "	24 00@....
No. 1, Bituminous	26 00@ ...
No. 2, "	24 00@....
American Scotch, No. 1, Cherry Valley	29 00@....
" " B—1, " "	27 00@....
" " No. 2, " "	25 00@....
No. 1, Massillon	27 00@....
B—1, "	25 00@....
No. 2, "	23 00@....
CAR WHEEL AND MALLEABLE IRON.	
No. 3 Lake Superior Charcoal	27 00@....
No. 4 " " "	28 00@....
Nos. 5 and 6 "	28 00@....
BESSEMER IRON.	
Nos. 1 and 2 Lake Superior Charcoal	28 00@....
FORGE IRON.	
No. 1, Gray	22 50@....
White and Mottled	21 50@....

Chicago.

April 3, 1876.

Specially reported by Messrs. ROGERS & Co., dealers in

The following are the present quotation for pig metal in our market:

Scotch and American pig iron.	
No. 1 Coltness	$38 00@....
No. 1 Gartsherrie	38 00@....
No. 1 Summerlee	37 00@....
No. 1 Glengarnock	36 00@....
No. 1 Eglinton	35 00@....
Warner's "American Scotch"	30 00@....
Massilon No. 1 Foundry	29 00@....
No. 1 Grand Tower Mo. ores (Bituminous)	29 00@....
No. 2, " " "	28 00@....
No. 1 Mill	25 00@....
No. 1 Foundry, Ohio	28 00@....
No. 2 " "	27 00@....
No. 1 Hanging Rock (charcoal)	28 00@....
No. 2 " " "	26 00@....
Union "A" 1 (Anthracite)	28 00@....
Union "B" 1 (Anthracite)	26 00@....
No. 1 Lake Superior (charcoal)	28 00@....
No. 2 Lake Superior "	26 00@....
No. 3 Lake Superior "	26 00@....
No. 4 Lake Superior "	28 00@....
Bessemer Steel Rails	65 00@....
New Iron Rails	45 00@ ...
Old Rails	28 00@....

Cincinnati.

April 4, 1876.

Specially reported by Messrs. TRABER & AUBERY, commission merchants for the sale of pig iron, blooms, ore, etc.

Below will be found closing quotations of our pig iron market.

CHARCOAL.		
Hanging Rock, No. 1 Foundry	$25 00@	....—4 mos
" No 2, "	23 00@	....—4 mos
" Mill	22 00@	....—4 mos
Tennessee, No. 1, Foundry	24 00@	....—4 mos
Tennessee, No. 2, "	23 00@	....—4 mos
" Mill	22 00@	....—4 mos
Missouri, No. 1, Foundry	.... @	....—4 mos

STONE COAL.

Ohio, No. 1, Foundry	22 00@23 00	—4 mos
" No. 2, "	21 00@22 00	—4 mos
Ohio Mill	20 00@21 00	—4 mos
Missouri, No. 1 Foundry	27 00@	—4 mos
" No. 2, "	25 00@	—4 mos
" Mill	24 00@	—4 mos

CAR-WHEEL.

Hanging Rock, C. B	40 00@50 00	—4 mos
Tennessee "	30 00@33 00	—4 mos
Missouri "	33 00@35 00	—4 mos
Alabama "	30 00@33 00	—4 mos

BLOOMS.

Charcoal	60 00@ 70 00	—cash

SCRAP IRON.

Cast	50c.@ 90	—cash
Wrought	1 00@1 30	—cash

Louisville. April 4, 1876.

Specially reported by Messrs. GEORGE H. HULL & Co.

Our market has shown a little more activity since last report, but without improvement in prices. On the contrary, inferior grades are offering freely at slight concessions. Holders of round lots evincing a disposition to realize rather than hold longer.

The usual time, four mos., is allowed on the quotations below:

HOT BLAST—CHARCOAL.

No. 1 Foundry, from Hanging Rock Ores	$25 00@26 00
No. 2 " " "	23 00@24 00
No. 1, Mill, from " "	—@—
No. 1. Foundry, from Alabama, Georgia and Tennessee ores	23 00@24 00
No. 2, Foundry, from Ala., Geor'a and Tenn. ores	22 00@23 00
No. 1, Mill, from " " " " "	21 00@22 00

HOT BLAST—STONE COAL AND COKE.

No. 1, Foundry, from Hanging Rock Ores	23 00@24 00
No. 2, " " " "	22 00@23 00
No. 1, Mill, " " " "	21 00@22 00
No. 1, Foundry, from Ala. Ga. and Tenn. Ores	23 00@24 00
No. 2, " " " "	22 00@23 00
No. 1, Mill, " " " "	21 00@22 00
No. 1 Foundry, from Missouri Ores	24 00@25 00
No. 2 " " "	24 00@25 00
No. 1 Mill, from Missouri Ores	25 00@26 00

COLD BLAST—CHARCOAL.

Car Wheel from Hanging Rock Ores	35 00@40 00
" " Tennessee "	28 00@30 00
" " Alabama and Georgia Ores	28 00@38 00
" " Kentucky Ores	28 00@40 00

Milwaukee. April 3, 1876.

In pig iron sales have been larger, but at less prices on Frankfort and Bay View.

per ton of 2,240 lb.

Frankfort L. S. Charcoal, No. 1	$28 00
" " " No. 2	27 00
" " " No. 3, 4 & 5	25 00
" " " No. 6	25 00
Mil. Anthracite L. S., No. 1	27 00
" " " No. 2	26 00
Wisconsin Iron, No. 1	25 00
Mahoning Valley Bit's No. 1	30 00
" " " No. 2	28 00

Pittsburgh, Pa. April 4, 1876.

Specially reported by A. H. CHILDS, Esq.

There is no change in the condition of the metal market since last report. Buyers are operating with caution and only for immediate wants.

No 1. foundry	$24 00@25 00—4 mos
" 2. "	22 50@24 00—4 mos
Gray forge	21 00@22 50—4 mos
White and mottled	18 00@20 00—4 mos
Warm blast charcoal	22 00@23 00—4 mos
Cold b last " Western	40 00@45 00—4 mos

Richmond, Va. April 3, 1876.

Reported by ASA SNYDER, Esq.

The makers and holders of charcoal iron in this State are decidedly more firm in their quotations. The few furnaces in blast have mostly sold ahead. So many of those out of blast are hopeless failures that it is not probable one half of this class could be "blown in" were prices 50 per cent. higher than now. Several of these have so far exhausted their wood land that, under no circumstances, can they again produce charcoal iron for several decades.

Virginia Cold Blast Charcoal Pig Iron	$27 to $33
" Warm " " " "	24 to 28
" " " Coke " " 1 X	23 to 24
" " " " " 2 X	21 to 22
" " " " " 3	20 to 21
" Anthracite 1 X	24 to 23
" " 2 X	22 to 22
" " 3	21 to 25

San Francisco, Cal.

From the *Commercial Herald*, March 23, 1876.

Stocks of pig iron are excessive, causing low prices to prevail. Business in general is very sluggish, and the tendency of prices seems to be toward a lower standard for bar and other kinds of iron. Tin plate is plentiful at low and nominal prices. Sydney tin, 21@21½c.

St. Louis. April 4, 1876.

Specially reported by Messrs. SPOONER & COLLINS, Commission Agents for all kinds of iron.

A reaction seems to have taken place in our market since our last report, for the worse. Many of our foundries are closed, and others propose doing so, and altogether the outlook for foundry irons is very gloomy. Mill iron continues in fair demand—prices unchanged.

We quote on four months' time:

No. Stone Coal No. 1 Fy.	$25 50	Massillon iron, A No	1.32@—
" " " 2 "	25 50	" " B "	1.3.@—
" " Gray Mill,	24@25	" " "	2.28@—
" Charcoal No. 1, Fdy.	24 50	Cold Bl. Car Wheel, Mo.	30@33
" " " 2, "	24 50	" " " " Tenn.	30@33
" " Gray Mill,	23@24	" " " " Ala.	30@33
Tenn. " No. 1, Fdy	24@—	" " " " H. R.	33@35
" " " 2, "	22@—	Mo. Charcoal Blooms	60@70
" " Gray Mill	22.50@—	" Scrap "	55@60
Va. Coke, No. 1, Fdy.	25@—	" " hammered Billets	75@80
" " " 2, "	23@—	Assorted Bar Iron	2 35, 90days
" "Gray Mill,	23@—	No. 1 Wrought Scrap	10 ch.
H. R. Char. No. 1, Fdy.	26@—	Heavy cast "	.95 "
" " " 2, "	24@—	Light " "	.60 "
" " Gray Mill,	24@—		

Montreal. March 28, 1876.

We continue to quote: Pig iron Eglinton and Clyde $21.00@21.50; Carnbroe $21 50@22; American $24@26; Summerlee and Calder $22.00@23.00; Langloan and Gartsherrie $22.00@23.00; Coltness $22.50@23.50; Hematite $30.00@31.00. Bar, per 100 lb., Scotch and Staffordshire, $2.20@2.25; best do., $2.50@2.60. Swedes and Norway $5.00@5.50; Lowmoor and Bowling, $6.50@7.00.—*Monetary Times.*

Prices Paid for Silver Ores at Western Reduction Works.

GEORGETOWN, COLORADO, March 26, 1876.

Silver is now quoted at 1.14, and the market here has declined about four cents per ounce since my last. Lead and copper unchanged. D. W. B.

Yield of ore in silver.	Price per oz. silver, on basis of 25 per cent. lead.*	Yield of ore in silver.	Price per oz. silver, on basis of 25 per cent. lead.
oz.	cents.	oz.	cents.
50	24	200	82
60	37	250	85
70	44	300	88
80	51	350	90
90	56	400	92
100	61	450	94
110	65	500	96
120	68	600	97
130	71	700	98
140	73	800	99
150	75	900	100
175	78	1000	101

* $1.00 paid for each per cent. over 25 per cent. lead.
* $1.50 paid for each per cent. of copper.
* Mill charges $4.00 per ton. Small lots $2.00

SALT LAKE CITY.—Ferruginous lead ores, $1.15 per oz. Ag., on a basis of 25 to 30 per cent. Pb. according to amount of silver in ore, under 30 oz., the basis would be 30 per cent. Pb. Siliceous ores $1.00 to $1.05, oz. Ag., on a basis of 15 to 50 per cent. Pb. This varies according to the amount of sulphur in the ore, and whether roasting is required. 2 per cent. of silica to be taken up by iron.

METALS.

NEW YORK, FRIDAY EVENING, April 7, 1876.

In some articles there has been considerable business done during the week under review, yet upon the whole trade may be pronounced dull. There are no indications of an early revival.

ERNEST W. S. MURRANT, Esq., of London, under date of March 23 says: "There have been some slight fluctuations during the week chiefly of a favorable nature, and perhaps there is no harm in again saying that we may possibly have at last reached the bottom."

Gold Coin.—During the week under review, gold has ranged from 112⅝ to 113¾ and closed at 113⅜.

Bullion.—The prices of silver bars remain without any change. Quotations are as follows: New York, $1.16½, gold, per oz.; San Francisco, 12 per cent. discount; and London, according to cable advices of to-day, is firm at 53½d. Fine gold bars are also unchanged, and quoted as follows: this market par ($20.67 gold, per oz.) to ¼ per cent. premium; San Francisco, par; and London, 84/7½d.

Copper.—This article has held the leading point of interest during the past two weeks. Last week we gave a rumor of a sale of 2,000 tons of Lake Superior copper for export. We are still unable to confirm this report, although it is generally believed that some business of this sort has been done, and that the particulars have been kept private. This is now followed by the announcement of a sale of 3,000,000 lb. to manufacturers and dealers, for Summer delivery, at 21@21½c. Prices are now firm at 22½@23c., the former being the asking price for Baltimore, which is attracting some attention. Chili bars were quoted, in London, yesterday, at £77.

Mr. MURRANT says of copper: "Chili remains in about the same position as that of a week ago, although prices are nominally about a £ better. The general opinion appears to be that at the sale of Australian, the stuff will go off at rather a high figure, and that all the 'bears' will be caught! Should this be so, no doubt other importers will also sell by auction, and thus revolutionize the trade; meanwhile, prices seem likely, with this article, as in the case of all other articles of foreign produce, to revert to a lower level. Prices have ranged from £76 to £77 10/, according to the Committee's Report."

Tin.—There has been a fair amount of business done in this article. Straits was quoted, in London, yesterday, at £83 10/ and L, and F. at £77. In this market the quotations, in gold are as follows: Straits according to quantity 16¼c @17c; L. and F. 16¾c; Banca 21¾c @ 22c; and Refined (only two tons here) 17¼c.

Mr. MURRANT says of tin: "In Foreign, little has been done, and that at reduced rates; yesterday some operations were carried out by speculators, of a character which rather 'puzzles the will,' and bank notes freely changed hands. The Committee's Report consists of a small business at 72/ to 73/ 6d., cash and arrival."

Tin Plates.—These are very quiet at the following quotations, in gold, per box: charcoal tins $7.37½@$7.50; and ternes $7@$7.25; and coke tins $6.37½@$6.50 and ternes $6.12½@$6.25.

Lead.—We are reported sales of about 120 tons of ordinary Domestic at $6.35@$6.40 gold, also 25 tons of foreign from dock at 6⅞c. gold. St. Louis prices are unchanged.

Spelter and Zinc.—Although the Combination price of Domestic Spelter is 8c. currency, yet there is a certain amount being constantly sold at a less figure. The total amount of business doing is but small. Sheet zinc is quiet at 8½c.@8¾c., gold.

Antimony has been very active with large sales at 16c., gold, closing firm at 16c.@16¼c.

Quicksilver is very quiet with prices unchanged and as follows: This city, 63c.@64c.: San Francisco, 60c. per lb.; and London, £10 per flask.

The San Francisco *Commercial Herald*, of March 23, says of Quicksilver: "The steamship *Vancouver*, for Hongkong, carried 573 flasks. Since then we have advices of an improvement in price, both in London and in China. The price here may be quoted nominally at 58c."

FINANCIAL.

New York Stocks.

FRIDAY, April 7, 1876.

No improvement has occurred in the stock transactions at this market. The dealings during the week have been tame and devoid of interest, and with but a single exception, we change the whole list to lower figures.

New Jersey Central RR.—The fluctuations in the stock of this company have been a notable feature of the week. It has sold as low as 99⅜ (seller 60 days), ex-dividend of 2½ per cent., which is payable on the 20th inst. The highest point attained during the week was 108; our closing price, 101¾ ex-dividend, shows quite a recovery from the extreme quotation, but a decline of over $5 per share from the final price in our last. Sales of this stock for the week have amounted to about 6,500 shares. This remarkable decline is attributed principally to the decreased coal earnings of the road during the past year; from their annual report this item alone shows a reduction of $917,545.81, and the total net decrease in earnings amounted to $1,166,120. There has also been a loss of revenue from the final withdrawal of the coal trade of the Delaware, Lackawanna and Western RR., and of the business of the Lehigh Valley RR. This large decrease in the earnings of the company compelled it to draw upon the surplus fund for the payment of dividends. This is now reduced to $212,330.11, and as a consequence, holders have a strong disposition to sell, for the prospects are very decidedly towards much lower dividends in the future, and it is generally thought they should have been reduced during the past year. A gradual revival of both passenger and freight business of this company, is anticipated during the present year in connection with the Centennial Exhibition.

Delaware, Lackawanna and Western RR.—This company announces a quarterly dividend of 2½ per cent. payable on the 20th inst. The stock closes at 116½, ex-dividend, with sales of nearly 2,500 shares for the week.

Chesapeake and Ohio RR.—We note a decided advance in the first mortgage bonds of this company, under quite liberal sales. The Supreme Court of Appeals of Virginia, has recently decided that the whole line of this road from Richmond to Covington is liable to taxation by the State.

St. Louis and Iron Mountain RR.—From the annual report of this company for the year 1875 we take the following: This road, as consolidated in 1874, embraced 684½ miles.

The gross earnings of the road from transportation for the year were	$3,802,941 36
The operating expenses for the year were	2,013,853 83
Net earnings	$1,789,087 53
Proportion of expenses to earnings, 52 96-100 per cent.	
The average earnings per mile of road	$5,559 85
The average expenses per mile of road were	2,944 23
Showing net earnings per mile of road	$2,615 52

Increase of net earnings after deducting operating expenses, over previous year, 45 per cent.

Proportion of operating, general, and other expenses, including taxes, to earnings, 57.56 per cent.

The stock of this company is steady at 22, with sales of some 300 shares for the week.

Union Mining Company of Tennessee.—11,304 shares of this stock has changed hands at from 1⅜ to $1.75 per share.

George's Creek Coal.—We note recent sales of this stock on the Baltimore stock market at from 141¾ to 142.

The Monigona Coal Company has declared a quarterly dividend of 2 per cent. on $305,200 of stock, equal to a disbursement of $6,104, payable in Boston on the 15th instant.

Kanawha River Improvement.—Congress has granted an additional appropriation of $300,000 for the improvement of the navigation of this river.

Rising Fawn Iron Company of Dade County, Ga.—$17,000 of the registered bonds of this company, due in 1877, have been sold at auction at $25 for the lot.

Bonds have sold to the amount of $126,000 at generally unchanged quotations.

Consolidation Coal Co.'s Stock has fluctuated widely in quotations during the week, but the transactions in it have been very small. Thus we learn of sales of 300 shares at from $42 to $43. 711 at from 42½ to 45¼, the highest point reached; and of 100 shares at 44⅝. It is now quoted at about $2 per share above the rate last week. Careful inquiry has failed to develop the foundation for this advance. The recent legislation by which

the charges of the company have been reduced one cent per ton per mile, is generally believed to be so carefully guarded that any effort to oppose the law will be defeated. We are inclined to look upon this movement of the stock as purely a Wall Street movement, and as not dependent on the prospects of the company.

Maryland Coal Co.—We note a decline in the stock of this company as indicated in quotations, but like the case of Consolidation stock, there have been but very insignificant transactions. 300 shares sold at 16¼, and 100 at 15 being the only sales we learn of. As in the previous case, this movement seems also to be a mere Wall Street freak, and not to be the result of any change in the prospects of the company.

Quotations and Sales of Stocks and Bonds,

For the week ending April 7, 1876.

STOCKS.

	Highest	Lowest	Closing	Shares sold.
Pennsylvania Coal Co	—	—	*270	—
Consolidation Coal Co	45⅛	42	43⅛	1111
Spring Mt. Coal Co	—	—	*24¾	—
American Coal Co	—	—	*53	—
Maryland Coal Co	16½	15	16½	400
Del., Lack., and West. RR. Co	119¼	115	†116½	2465
New Jersey Central RR. Co	108	‡99¾	†101¾	6498
Delaware and Hudson Canal Co	119¾	118⅞	118⅞	544
Quicksilver Mining Co. pref'd	—	—	23	100
" " " Common	17½	16⅞	16⅞	710
Mariposa Land & Min. Co. various	11	7½	—	—
St. Louis & Iron Mountain RR	22	21	22	310
Lehigh & Wilkes-Barre Coal Co	—	—	*40	—
Total Shares sold				12138
Sales for the week previous				4267
Increase				1871

* These are nominal quotations.
† Ex Dividend. ‡ Seller 60 days.

BONDS.

	Sales.	Price
Ches. & O. R. R. 6s, 1st. cou. on	44,500	34¼@ 35¼
" " " ex coupon	—	— @ —
Central RR. of N. J. 1st Mtg. N.	5,000	@113⅜
" " " 1st Cons.	—	— @ —
" " " Convt.	23,000	109 @109⅜
Del. and H. Canal, 1st Mtg. 91	1,000	— @113
" " " 78, '84	—	— @110½
" " " Reg.	14,000	110½@111
Del., Lack. & W. R. R., 7s, conv.	—	— @ —
" " " 2d Mtg.	—	— @ —
St. Louis & Iron Mount'n 1st Mtg	5,000	101 @101¾
St. Louis & Iron M'tn, 2d Mtg.	1,000	— @ 76⅛
Lehigh & Wilkes-Barre Cons.	34,000	95¼@ 95¾
Total Sales	$126,500	

Closing quotations, in the absence of sales, represent the latest prices bid.

Philadelphia Stocks.

PHILADELPHIA, April 7, 1876.

With the exception of a slight fractional advance in the shares of the Pennsylvania RR., the Philadelphia stock list is lower. The feature of the week has been in the activity of the Reading RR. stocks, the transactions in which foot up the very large amount of nearly 65,000 shares; the stock closed at a decline of 2⅝ from the final price in our issue of the 1st inst. The *Public Ledger*, in a recent issue, says, with regard to this stock: "It is probably fair to presume that about as large a proportion of these sales were of shares not owned or in possession of the parties selling them, as the actual transfers show, was the fact the day before. These are the heaviest daily sales in Reading Railroad since the stock was some years ago removed by Mr. GOWEN, the President of the company, from the vortex of speculation in Wall street, by removing thence the transfer agency maintained there. Since then the stock has been held with much steadiness, until just now."

The same authority observes "that the price of this stock is mainly fixed by parties who are selling what they do not own, and attributes the movement to the fact, that the "bears" have a controlling influence on the same.

Auction Sales of Stocks and Bonds for the week have been as follows:

Lehigh Valley Iron Co.—120 shares par value, $15 per share, at par.

Lehigh Coal and Navigation Co.—$577 6 per cent. bonds at 102⅜ per cent.

Huntingdon and Broad Top RR. and Coal Co.—Cons. mortgage coupons, from April, 1871, inclusive at 58 per cent.

Susquehanna Coal Co.—$3,000 of the 6 per cent. bonds, interest due January and July at 76 per cent.

Lehigh Valley RR. Co.—$1,000 6 per cent. bonds at 107½ per cent.

Bonds are firm, with transactions moderately maintained.

Quotations and Sales of Stocks and Bonds,

For the week ending April 6, 1876.

STOCKS.

	Highest	Lowest	Closing	Shr's
Lehigh Valley RR. Co	62	61½	61⅞	923
Pennsylvania RR.	57¼	56¼	56⅞	43250
Reading RR.	50	47½	47½	61450
Lehigh Coal and Nav. Co	50⅛	49⅞	50	2173
Penn. Canal	—	—	*9	—
Buck Mountain Coal Co.	—	—	*30	—
Fulton Coal Co.	—	—	*3½	—
Locust Mountain Coal Co	—	—	—	—
Westmoreland Coal Co.	—	—	*84	—
St. Nicholas Coal Co.	—	—	*1	—
Cambria Iron Co.	—	—	16¼	91
Crane Iron Co.	—	—	*46	—
Emaus Iron Co	—	—	—	—
Pennsylvania Salt Manufact. Co.	74	69	69	169
Total shares sold				110,036
Sales for the week previous				67,321
Increase				42,735

* These quotations are nominal.

BONDS.

	Sales.	Price
H. and B. T. RR. 1st mortgage, 7s	—	— @109
" " " 2d "	1,000	— @104
" " " 3d " cons	—	— @ 57
Lehigh Valley RR. Con. mtg. 6s, Reg	52,000	100¾@101
" " 7s, 1910	22,000	110⅞@111¼
" " 6s Reg. and Con	—	— @10⁰ ½
Pennsylvania RR., 1st mtge. 6s	1,000	— @104⅝
" gen. " con. 1910	3,000	104¾@105
" " gen. " 6s, reg.	4,000	— @103
" " Cons. M. 6s reg.	4,000	— @ 99¾
Phil. & Reading RR. 7s '93	2,000	†109¼@113
" " G. M. 7s, reg.	3,000	— @109
" " " Deb. 6s	9,000	— @ 82½
" " new convertible 7s	3,000	— @104
Phil. & Reading C. & I. Co. Deb. 7s	3,000	— @ 81
" " Various tracts	—	89 @ 99
Lehigh Coal & Nav. Co., 6s '84	800	— @102¼
" " RR. 6s, '97	—	— @104
" " gen m. 7s Reg.	7,000	— @105
" " Convt. gold, '97	18,000	105 @105½
Penn. Canal, 6s	3,000	76¼@ 77
Penn. and N. Y. Canal, 7s	1,000	— @109
Ches. and Del. Canal, 6s	2,100	— @ 86½
Susquehanna Canal, 6s	—	— @ 77
Delaware Division Canal, 6s	—	— @ 99¾
Susquehanna Coal Co. 7s	—	— @ 85
Buck. Mount Coal Co. 6s	—	— @ 97⅛
Penn. Gas Coal Co. 6s	—	— @100¼
Total amount of sales	$138,900	

Closing quotations, in the absence of sales, represent the latest prices bid.
‡ † Ex Interest.

Gold and Silver Stocks.

NEW YORK, April 7, 1876.

The San Francisco share list is generally lower and we note but very few advances, compared with our last, and none of these over $1 per share. Hale & Norcross, and Chollar Potosi are the most prominent items in the downward movement, the former having declined $10, and the latter $19 per share from last week's quotations.

Consolidated Virginia.—This company has declared its regular monthly dividend of $2 per share, from the March earnings, payable on the 10th, inst. It will be observed that this dividend is equivalent to $10 per share on the old stock basis, and aggregates a sum of $1,080,000. It is equivalent to the annual rate of nearly 30 per cent. on the present market value of the stock.

The present weekly yield of ore from this mine equals nearly 6,000 tons. It is anticipated that the bullion product for March will amount to fully $2,500,000, if not $3,000,000.

California stock is lower; recent information from the mine states that they are very much troubled with water. The joint C. and C. shaft was down 1,158 feet at last advices.

Belcher is unchanged; present daily yield of about 500 tons. This company has declared a dividend of $104,000, equal to $1 per share.

Consolidated Imperial Mining Company.—We give below a tabulated statement showing the details of the organization of this company.

Companies.	Lineal Feet.	Present Shares.	New Shares.
Imperial	183½	100,000	267,735
Empire	75	50,000	98,077
Con. Gold Hill Quartz	34⅓	20,000	22,009
Eclipse	70	25,000	44,872
Trench	20	5,000	12,820
Bacon	65	24,000	41,667
Bowers	20	5,000	12,820
Totals	467 5-6	229,000	500,000

The par value of these shares will be $100 each, making a capital stock of $50,000 000. This combination will be operated through the Imperial-Empire shaft, which is one of the finest on the Comstock lode. It will take till about the 1st of May to complete the organization.

QUOTATIONS:

	No. of feet on Vein.	No. of shares.	Mar. 30.	April 6.
Sierra Nevada	3,300	100,000	$25	$24
Union Consol'd	600	100,000	18	18
Mexican	600	108,000	41	39
Ophir	675	108,000	72	69
California	600	540,000	89	85
Consol'd. Virginia	710	540,000	85	185
Best & Belcher	540	100,800	64	59
Gould & Curry	612	108,000	23	21
Savage	771	112,000	20	18
Hale & Norcross	400	16,000	80	70
Chollar Potosi	1,400	28,000	145	126
Alpha Consol'd	306	30,000	62	63
Imperial	184	100,000	17	17
Yellow Jacket	57	120,000	35	135
Kentuck	95	30,000	17	17
Crown Point	541	100,000	25	24
Belcher	1,040	104,000	35	35
Overman	1,200	38,400	84	81
Caledonia	2,188	100,000	12	†12
Justice	2,100	105,000	27	30
Raymond & Ely	5,000	30,000	18	17
Meadow Valley	....	60,000	3	2
Eureka Consolid.	....	50,000	11	13
Eureka G. V.	1,680	20,000	3	3
Silver Hill	5,400	54,000	11	9
Julia	3,000	110,000	16	17

† These companies have increased their share capital to five for one of old stock.

Copper Stocks.

Specially reported by Messrs. WILSON W. FAY & Co., Bankers and Brokers, Room 7 Traveller Building, 31 State Street, Boston.

BOSTON, THURSDAY EVENING, April 6, 1876.

The market on copper has weakened this week, some little collateral stock having been thrown on the market. Allouez is steady at 19 bid, but no movement just at present. Calumet firm. Sales at 169 this P.M. Copper Falls has weakened to $3 asked. There is to be a special meeting on the 19th, when it is intended to reorganize for the purpose of levying an assessment, hence the drop in price. Franklin is steady at 13½ bid. Star is offered at 10, the assessment of 50 just levied has a demoralizing effect on the small copper. National is steady at 2⅜ bid. Madison 20 bid. Rockland ¼ bid.

Sales.—We note sales of copper stocks during the week as follows: Small transactions in Calumet and Hecla at $167.25. Quincy sold to the amount of 40 shares at $40.50 per share; Pewabic at $5 per share, and 500 shares of Duncan Silver at $1.50 per share.

DESCRIPTION.	Par Value.	No. of Shares.	CLOSING. Bid.	Asked.
Allouez	$50	20,000	$19 00	$21 00
Calumet and Hecla	25	80,000	168 50	169 00
Central	25	20,000	30 00	30 50
Copper Falls	25	20,000	0 00	3 00
Dana	25	20,000	8	10
Franklin	25	20,000	13 50	14 00
Humboldt	25	20,000	15	20
Madison	25	20,000	20	30
Mesnard	25	20,000	55	62½
Minnesota	25	20,000	2 00	2 25
National	15	20,000	2 37½	2 62½
Osceola	25	40,000	19 00	20 00
Petherick	25	20,000	150	65
Pewabic	25	20,000	4 87½	5 12½
Phenix	25	20,000	12 00	13 00
Quincy	25	20,000	40 00	40 50
Ridge	25	20,000	5 00	5 25
Rockland	25	20,000	25	40
International Silver	20	60,000	15	20
Star	25	20,000	5	10
Superior	25	20,000	12	15
Duncan Silver	20	60,000	1 45	1 55

† Assessment paid.

Gas Stocks.

NEW YORK, April 7, 1876.

Gas stocks continue dull, and we change but few of our quotations. The sales at private hands during the week have been very limited at prices given below.

Auction Sales of Stocks for the week have been as follows:

Metropolitan Gas Company, 26 shares at $146½, also $800 of their scrip stock at $102½.

Manhattan Gas Company, 115 shares at from 258½ to 260¼.

Peoples Gas Company of Brooklyn, 400 shares, (hypothecated) at $62 per share.

Metropolitan Gas Company.—This stock exhibits quite an advance, owing doubtless to their recent success in their suits against the city. Concerning these a correspondent advises us as follows:

"It may be of interest to the readers of the ENGINEERING AND MINING JOURNAL, to know that the Metropolitan Gas Light Company, of New York, obtained within the last week judgments against the city, to the amount of about $400,000, for public lighting for the years 1871 and 1874. In said amount cost of suit and interest is included, which is equal to about $70,000. To one of said judgments reference is made in your issue of April 1, 1876."

The Suburban Gas Company sued the city to recover $8,000 for gas claimed to have been furnished. The complaint was dismissed by Judge Donohue, before whom the case came up for trial, in Supreme Court, Circuit, recently, on the ground that the action should be brought against Westchester County, and not against the city.

Lighting Brooklyn Streets.—The Committee of the Board of Aldermen, has on lamps and gas, recommended the execution of contracts with the gas companies at $2.25 per 1,000 feet, and the abolition of 2,879 lamps, at a saving of $227,000.

Gas in the New York Post Office.—The present gas consumption of this building amounts to about 50,000 feet per day, during the winter it averaged about 55,000, which at $2.50 per 1,000 amounts to $137.50 per day.

The Camden, New Jersey, Gas Company.—At the last meeting of council of this city, the lighting committee was instructed to confer with the gas company, in order to secure a lower rate for the gas supplied to the city.

The company propose to furnish the city with gas for $2.50 per 1,000 feet, provided the lamps were to be allowed to burn until daylight.

There being but a minority of the highway committee present, another conference was arranged for.

Eastern Gas Stocks.—The following transactions in the stocks of companies located in the United States, are reported to us:

Salem, Mass., Gas Company, 18 shares at 100 per share.

Lawrence, Mass., Gas Company, 5 shares at 126½ per share.

East Boston Gas Light Company, 26 shares at 31½ per share.

Boston Gas Light Company small sales at $795 per share. The semi-annual interest on the 6 per cent. bonds of this company ($500 000 due in 1880) amounting to $15,000 was paid on the 1st inst.

Auction Sales have been as follows:

Dorchester, Mass., Gas Company, 5 shares at 98.

Marlboro, Mass., Gas Company, 25 shares at 55.

San Francisco Gas Co.—We note recent sales of some 400 shares of this stock at from 99½ to 100.

Peoples Gas Co., Baltimore.—Sales of 50 shares have been made at $25¼ per share.

Montreal Gas Co.—1,437 shares have changed hands at from 167¼ to 167¾.

Halifax, N. S., Gas Light Co. intends building a new retort house at their works in Freshwater. The building will cost about $40,000.

Des Moines, Iowa.—A new gas company has been chartered by the Common Council of this city.

St. Louis, Mo.—It is stated that all of that part of the

city north of Washington Avenue will be lighted with kerosene lamps, saving, thereby, $2,000 per year.

Washington Gas Co.—This company has contracted with Messrs. MORRIS, TASKER & Co., Limited, to build one telescopic holder 128 feet in diameter, 28¼ feet lift, with 12 cast-iron columns 65 feet high, and wrought-iron lattice girders; four purifiers 25 by 25 feet by 4½ feet with lifting apparatus for each; two scrubbers 45 feet high and 12 feet in diameter; five iron trussed roofs of about 68 feet span; also the 20-inch connections necessary for the new scrubbers and purifiers. Messrs. MORRIS, TASKER & Co. are also putting in the iron work for a new purifying house at Newark, N. J., and are furnishing seventy Morton lids to the New Orleans gas company.

The Centennial Gas Commission of the American Society of Civil Engineers have issued the following announcement, relative to the representation of the gas interests at the Centennial:

"SIR: It is of much importance to the gas interests of this country, that a representation of the progress of gas-lighting in America during the past century, should be made at the Centennial.

"American engineers, superintendents and contractors of gas-works, desiring to contribute plans, models or drawings of gas-works or gas machinery, are respectfully notified that their contributions will be received and taken charge of by the committee of the American Society of Civil Engineers, and placed in the portion of the Centennial Buildings set apart for that purpose.

"If you have plans, drawings or models you wish to contribute, please notify the undersigned at the earliest possible moment."

The office of the Society is at No. 4 East Twenty third street, New York.

Chicago Street Lamps.—A petition has been presented to the Board of Aldermen of this city for the introduction of self-regulating burners on the street lamps belonging to the city.

Price of Gas.—We collect, principally from recent issues of this Journal, the following list of Gas Companies (the majority of which have made reduction in the price of gas since the first of January), showing the present rate charged by them per 1,000 cubic feet:

Little Rock, Ark[1]	$5 00	Elizabeth, N. J.	$3 00
Englewood, N J.[20]	5 00	Springfield, Mass.[13]	3 00
Augusta, Ga.	4 00	Baltimore. Md.[13]	3 00
Bayonne City, N. J.	4 00	Altoona, Pa.	3 00
Charlestown, W. Va.	4 00	Harrisburg, Pa.	3 00
Lyons, N. Y.	4 00	Reading, Pa.	3 00
Belfast, Me.[2]	4 00	Marquette, Mich.	3 00
East Newark, N. J.	4 00	Williamsport, Pa.	2 92
Meriden, Conn.	3 93	Newark, N. J.	2 85
Hagerstown, Md.	3 75	St. Louis, Mo.	2 85
Brockville, Ontario	3 75	Brooklyn, N. Y. (six companies), each	2 75
Bloomfield, N. J.	3 75	Harlem, N. Y.[14]	2 75
Staten Island, N. Y.[3]	3 75	Syracuse, N. Y.	2 75
San Francisco, Cal.	3 75	New Haven, Conn.	2 75
Rome, N. Y.	3 60	Hartford, Conn.	2 75
Camden, N. J.	3 60	Albany, N. Y.	2 75
Eastchester, N. Y.	3 50	Hoboken, N. J.	2 75
Wilkes-Barre, Pa.[4]	3 50	Jersey City, N. J.	2 75
Charlottesville, Va.[5]	3 50	Zanesville, Ohio.	2 70
Marietta, Ohio[6]	3 50	Poughkeepsie, N. Y. (Citizens')[15]	2 70
Elkhart, Ind.	3 50	New York City (four companies), each	2 50
Guelph, Ontario	3 50	New York City (Municipal Company)[16]	2 50
Peoria, Ill.	3 50	Chicago, Ill.	2 50
Bath, Me.	3 50	Trenton, N. J.	2 50
Terre Haute, Ind.	3 50	Geneva, N. Y.	2 50
Jamaica Plains, Mass.[7]	3 50	Washington, D.C.[17]	2 25
Pottsville, Pa.[8]	3 50	Boston, Mass.[14]	2 25
Cohoes. N. Y.	3 50	Providence, R. I.	2 25
Fredericksburg, Va.	3 40	Buffalo, N. Y.	2 25
Akron, Ohio.	3 30	Cincinnati, Ohio.[18]	2 25
Utica, N. Y.	3 25	Lowell, Mass.	2 25
Laclede, St. Louis, Mo	3 25	Philadelphia, Pa.	2 15
York, Pa.	3 20	Sunbury, Pa.	2 00
Nantucket, Mass.[9]	3 00	Allegheny City, Pa.	1 80
Erie, Pa.[10]	3 00	Pittsburgh, Pa.	1 00
Knoxville, Tenn.[11]	3 00	Detroit, Mich.[19]	1 00
Tiffin, Ohio.	3 00		
East New York.[12]	3 00		
Richmond. Va.	3 00		
Cumberland, Md.	3 00		

[1] The gas used here is made from Pittsburgh coal and pine knots. [2] Ten per cent. discount on bills over $10, and five per cent. discount for bills under $10. [3] Five per cent. off for prompt payments. [4] Ten per cent. discount for prompt payment. [5] Rent of meter 20c. per m. [6] 20c. per m. discount for prompt payment, and 30c. additional to this to all persons using 3,000 feet and over. [7] This company charges the city $3 per m. [8] Ten per cent. reduction from bills if paid within 20 days. [9] Rent of meter 15c. per m. [10] This company receives from the city $28 per annum for each lamp. [11] Rent of meter 15c. per m. [12] This company has reduced to this figure in exceptional instances, the general rate charged by them being $4 per m. [13] One-twelfth discount from bills for prompt payments. [14] These rates will go into effect on the 1st of April next. [15] Gwynne-Harris process. [16] This is a water gas manufactured by the Tessié du Motay process. [17] This rate will go into effect on the 1st of May. [18] There is a second gas company in this city which, it is stated, supplies consumers at $1 per m. [19] Naphtha gas. [20] Five per cent. discount from bills for cash.

The following list of Companies in New York and vicinity are corrected weekly by GEORGE H. PRENTISS, Broker and Dealer in Gas Stocks, No. 30 Broad st., N. Y.

Quotations "bid" and "asked" of New York City and Vicinity Gas Companies are on the $100 of stock and not on one share.

Companies in New York and Vicinity	Cap. Stk.	Par.	Last Dividend.	When Paid.	Bid.	Askd.
			pr.c			
Mutual, N. Y.	$5,000,000	$ 100	2½	Jan. '76	108	108½
" " Bonds	900,00	1,000	‡3½	Feb. '76	105	
NewYork, "	4,000,000		5	Jan. '76	140	145
Metropol. "	2,500,000	100	5	Mar. '76	145	150
" " Certf.	1,000,000	...	3½	" "	102	103½
" " Bonds	500,000	1,000	3½	Jan. "	105	
Harlem "	1.850,000	50	4	Feb. '76	115	120
Manhattan"	4,000,000	50	10	Jan. "	256	260
Brooklyn, B'klyn	2,000,000	25	5	Nov. '75	190	195
Nassau "	1,000,000	20	4	Jan. '76	90	95
" "Certf.	700,000	1,000	3½	Nov. "	95	98
People's "	1,000,000	10	3½	Jan. '76	60	70
" "Certf.	300,000	1,000	3½	Jan. '76	85	86
" " Bds	325,000	....	3½	Feb. "		95
Metropol. "	1,000,000	10	3½	Nov. '75	70	75
Wmsburgh "	1,000,000	50	5	Jan. '76	120	125
" "Certf.	1,000,000	....	3½	Jan. "	98	100
Citizen's "	1,200,000	20	2½	Jan. '76	95	100
" "Certf.	320,000	1,000	3½	April "	99	101
J. C. N.J.	386,000	20	5	July,'75	160	170
Centl. Westch. N.Y.	466,000	50	4	July, "	95	100

‡ Gold.

Companies out of Town.*	Cap. Stk.	Par	Bid	Askd
People's " " of J. C.			125	135
¶Citizen's G. L. Co., New'k. N.J.	1,095,000	50	85	90
Hempstead" " L. I., N.Y.	40,000	100		100
Jamaica, " " " "	25,000	100		100
Richmond Co., S. I. "	300,000		100	105
Citizens', Rochester, "		200	60	68
Rochester Gas Co., "		200	50	
‖People's G. L. Co. Albany,"	1,000,000	100		40
§Mutual " Buffalo "	750,000	100	45	55
Mutual " Detroit Mich.		50	18	
TroyG. L. Co., Troy, N. Y.			108	
Brockport, N. Y., G. L. Co.	25,000	100	60	80
†Baltimore G. L. Co., Balt., Md	2,000,000	100	180	185
People's G. L. Co., Balt., Md	2,000,000	25	25¼	26
Hannibal G. L. Co., Hanni., Mo.	100,000	100	95	100
La Clede, St. Louis, Mo	1,200,000	100	110	115
Lewiston G. L. Co., Lewis., Me	400,000	100	33	
Chicago G. L. Co., Chicago, Ill.	2,000,000	100	140	
Jacksonville, Ill.	120,000	100	82	
‡Lima, Ohio.	60 000	100	10	
Derby G. L. Co., Derby, Conn.	160,000	100	60	80
Woonskt. G. L. Co.Woonskt, R.I.	150,000	100	100	
Fort Wayne G. L. Co. F. W., Ind		100	90	100
North. LibertiesG. L. Co. Phila.		25	29	
Wilkes-Barre G. L. Co W. B. Pa.		50	70	
Washington G. L. Co., Phila.			42	43
Pottsville, Pa. Gas Co.		50	40½	
Portland G. L. Co. Portland, Me	350,000	50	72	75
Hartford G. L. Co., Hartford, Ct	700,000	25	41	
Boston G. L. Co., Boston, Mass.	2,500,000	500	795	800
East Boston, Mass		25	132	
Chelsea G. L. Co. Chelsea, "	300,000		139	
Cambridge G. L. Co., Cam., "	700,000		132¾	
Louisville G. L. Co., Louis., Ky.			127	
Cincinnati G. L. Co, Cincin, O.				200
St. Louis G. L. Co.		50		160
Carondelet G. L. Co., Mo.		50		6¼
S. F. G.L. Co. San Francisco, Cal	10,000,000	100	99¼	99¾
City G. L. Co. Montreal, Can.	1,440,000	40	156⅜	
Consumers G. L (old.) Tor., Ont	600,000	50	132½	
Hamilton G. L. Co., Ont.	150,000	40	112½	
Halifax G. L. Co., Halifax, N.S.	400,000	40	145	150

* These quotations represent the latest obtainable prices at which sales were made.

† This Company has issued $1,000,000 in certificates in addition to their stock indebtedness, on which they pay interest at the rate of 6 per cent. gold.

‡ This Company has $30.000 in bonds outstanding.

§ $200,000 represents the bonded indebtedness of this Company; these bonds are quoted at from 80 to 85.

‖ $350,000 of the indebtedness of this company is represented by bonds.

¶ $124,000 of the indebtedness of this company is represented by bonds; also $53,000 in certificates, which is included in the aggregate stock debt quoted.

AMERICAN INSTITUTE OF MINING ENGINEERS.

OFFICIAL BULLETIN.

The third volume of Transactions of the Institute has been mailed to all members and associates elected prior to the February meeting. Prompt notification is requested in cases where the volume has not been received.

Foreign members of the Institute may obtain the volume by remittance of five dollars to the Secretary.

Copies of Volumes I. and II. may be had of the Secretary for five dollars each.

THOMAS M. DROWN, Secretary,
Lafayette College, Easton, Pa.

MARCH 8th, 1876.

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It is the property of a large and influential company of Colliery Proprietors and Ironmasters, who represent many of the largest and most important coal and ironworks in the Kingdom.

It is the recognized Organ of the Coal and Iron Trades, having the cordial approval and sanction of the Mining Association of Great Britain, the North of England Institute of Mining Engineers, the South Lancashire and Cheshire Coal Association, the Midland Institute of Mining Engineers, the South Staffordshire and East Worcestershire Institute of Mining Engineers, the Coal and Ironmasters' Association of Scotland etc., etc.

Its subscribers comprise nearly all the proprietors, managers, and agents of collieries and ironworks in the United Kingdom, and include also a very large proportion of the upper class of officials entrusted with the management of the various departments of coal mining and iron making. It also circulates largely amongst gentlemen engaged in scientific pursuits and in the various branches of manufacture and commerce.

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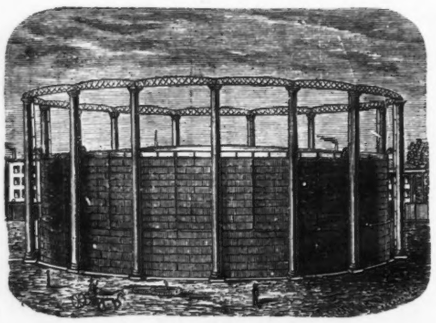

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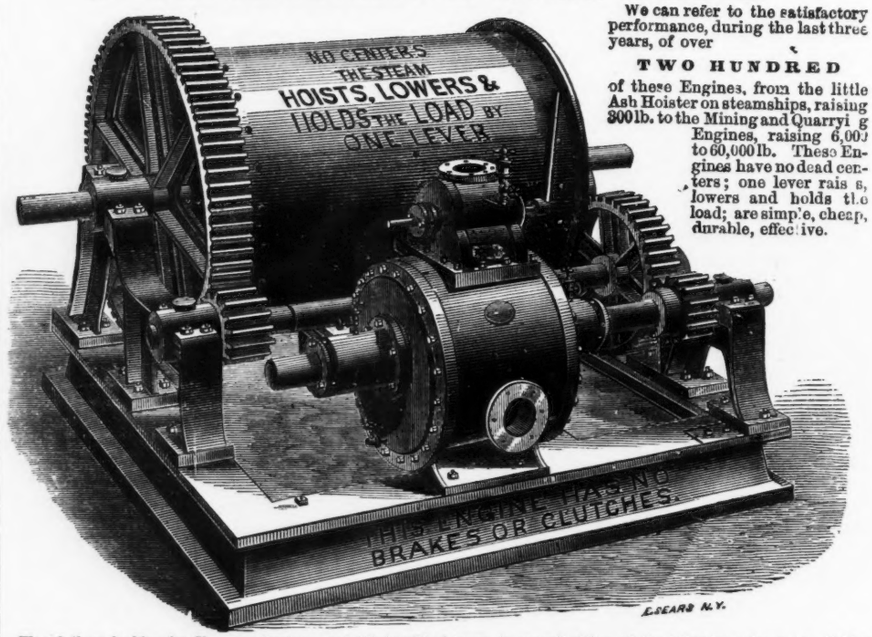

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